JAMES KINNEAR • STEPHEN L. SEWELL

SOVIET T-10

HEAVY TANK AND VARIANTS

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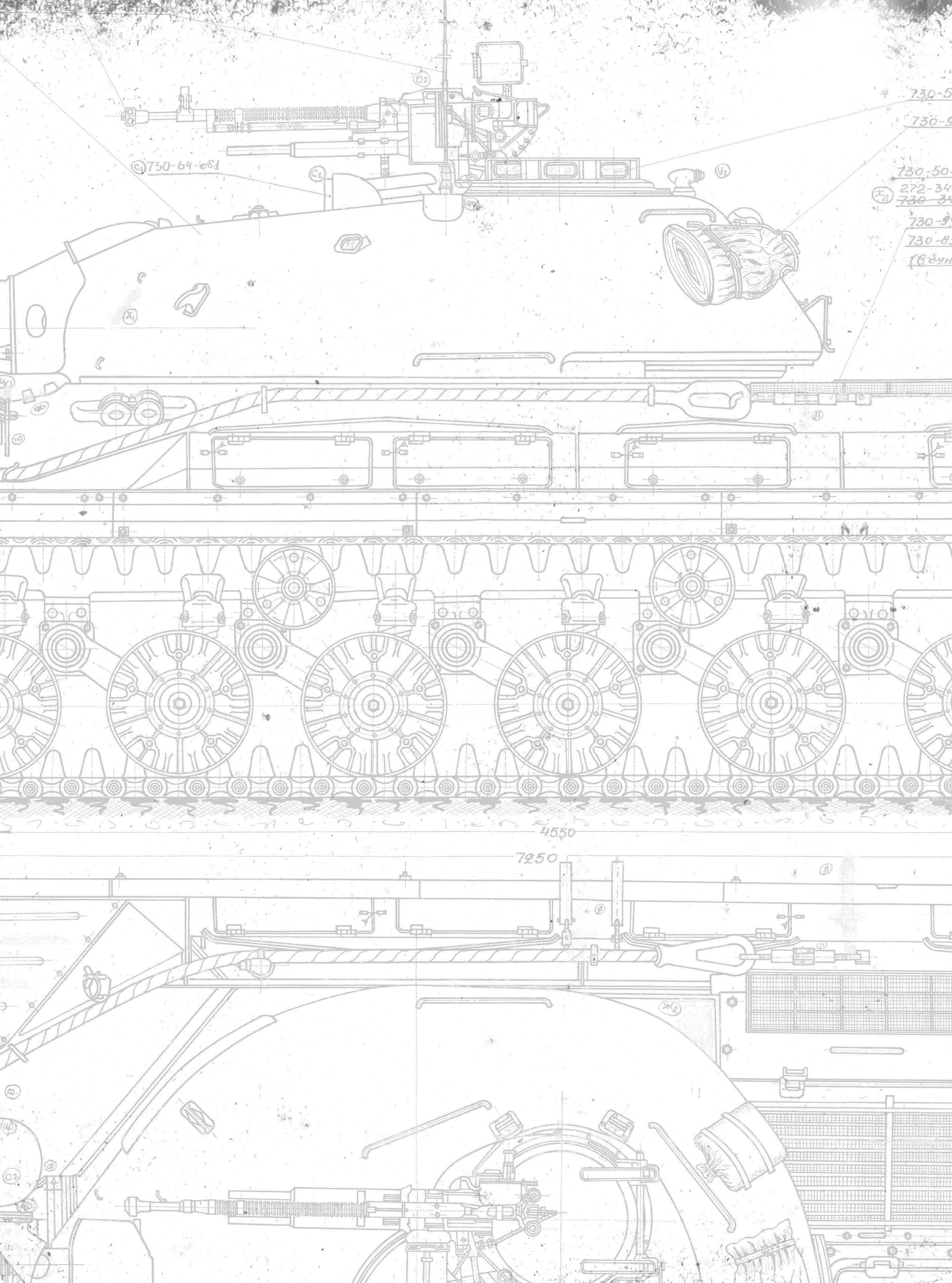

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James Kinnear and Stephen L. (Cookie) Sewell

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In particular, thanks must go to Andrey Aksenov, Aleksandr Koshavtsev, Yuri Pasholok and Igor Zheltov in Russia, Sergei Popsuevich in Ukraine, and Steven Zaloga in the US, all of whom provided what material they had available to ensure completeness of this work. Thanks also go to Sergei Netrebenko and Evgenniy Ivanov for the provision of invaluable original source research material.

The artwork for this book was provided by Andrey Aksenov and the drawings by Aleksandr Koshavtsev.

NOTE ON THE TRANSLATION OF THE RUSSIAN LANGUAGE

The Russian alphabet has more characters than the Latin based English language, while the Russian language is also grammatically complex and subject to varying translation depending on context, gender and time period. Therefore it is not always possible to directly translate Russian terms or names into English. For instance, Iosef Kotin the tank designer has a given name that starts with a Russian letter with no English equivalent, such that he might be called Zhosef, or Iosef (Joseph). Further, Russians are historically formal in addressing each other and use the patronymic (the father's given name) as the middle name part of a person's formal address. Kotin's father was Yakov (Jacob), a name that also starts with a letter not in the English language alphabet. So Kotin becomes Zhosef Yakovlevich Kotin, abbreviated to the awkward English translation Zh. Ya. Kotin. Therefore for ease of reading in English, the authors have simplified the translations, such as in the case of Kotin omitting the patronymic and naming him Iosef Kotin. Similarly, designations such as Ob'iekt, again with a specific Russian letter in the middle with no English equivalent, have been simplified as Obiekt, and so on.

Further, there are inherent difficulties in consistency when detailing production plants, for which the Russian term is 'Zavod' or 'Fabrika'. The Leningrad Kirov Zavod (LKZ), where heavy tanks from the KV to the T-10 were built, is often referred to colloquially as the 'Kirovsky Zavod' (the Kirov Plant), as all Russians know its location as being in Leningrad, now St Petersburg. Meanwhile, the Chelyabinsk Kirovsky Zavod (ChKZ) in the Urals, which was established after the evacuation of the machine tooling and personnel from the original Kirov Plant in the autumn of 1941, was renamed Chelyabinsk Tankovy Zavod (ChTZ) from 15 May 1958. This is why plant references are often conflated, and often the plant drawings are themselves misleading, as for instance ChKZ 'stamps' were used long after the plant was renamed ChTZ. The ChKZ and ChTZ plants are one and the same, the designation changing only according to the date concerned, and T-10 production spanned the years when the changes were made.

The authors trust this the simplification of translation and terminology for ease of reading in English is acceptable, and no slight is intended by dropping the patronymic from the names of those Russian nationals mentioned in the book.

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INTRODUCTION

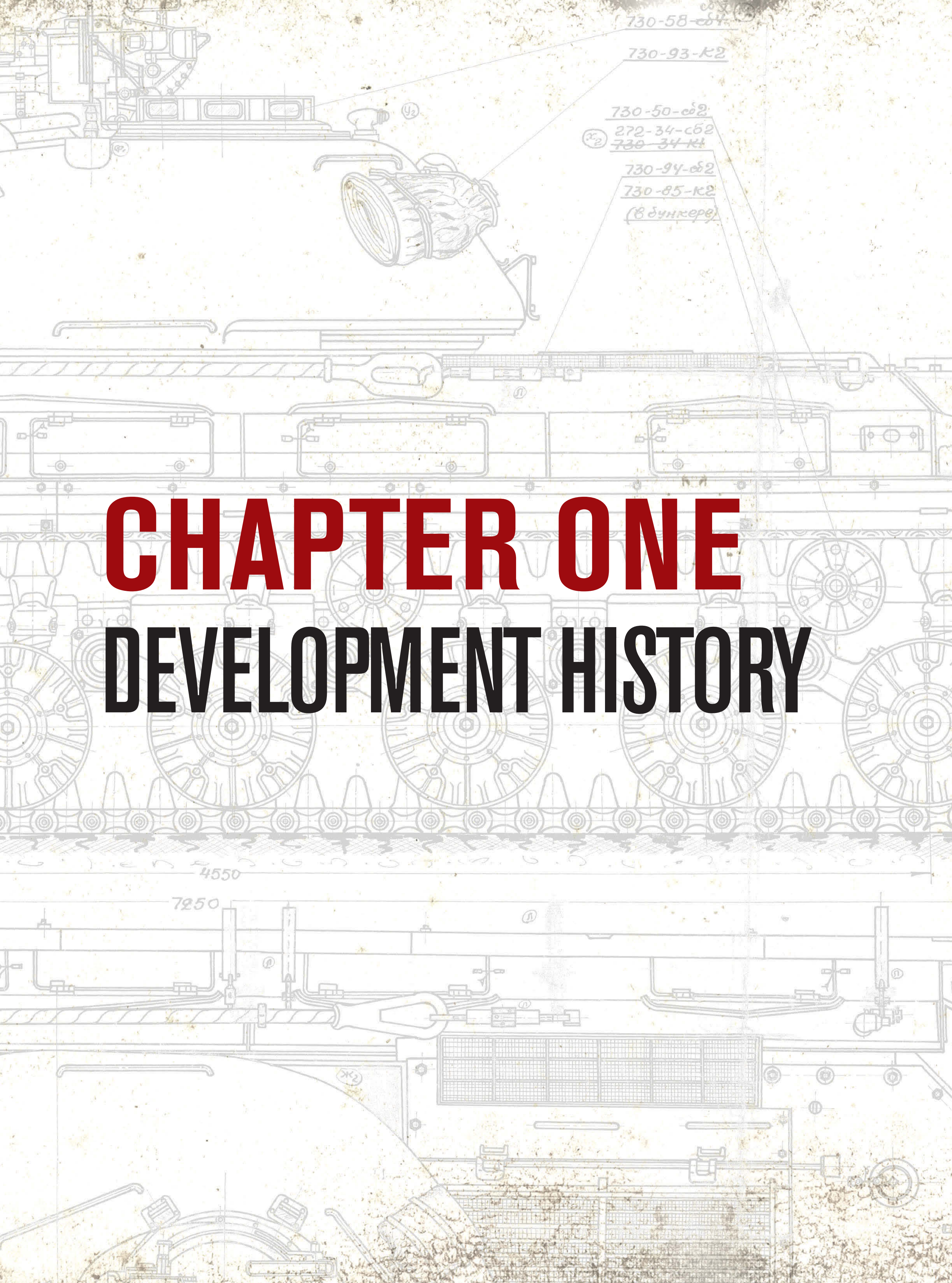
The T-10 was the last series production Soviet heavy tank, the last of the Stalin heavy tank family which began with the IS-85 (IS-1) introduced into service in 1943, followed by the wartime IS-122 (IS-2), and preceded directly by the post-war series production IS-3 and IS-4 heavy tanks, which were both technically advanced but had proved troublesome in service.

When introduced into service in 1953, the enigmatic T-10 represented a return to the 'classic' Soviet heavy tank, with a combat weight of under 50 metric tonnes. The T-10 series was relatively obscure in service, and, as with the IS-4, was not exported outside the Soviet Union. Although considered a major threat to NATO tank forces, continuing as it did the genealogical line started with the IS-3 in 1945 that had been such a shock to Allied forces at the 1945 Allied Victory Parade in Berlin and had prompted major heavy tank development programmes in the US, UK and France, the T-10 also represented the end of an era. The high cost of manufacture and considerable maintenance requirements of the T-10 were well known at the time of its service, while the years under Soviet Premier Khrushchev were difficult for the T-10 as the rocket enthusiast Khrushchev was against all gun tanks – and heavy tanks in particular. While he may have been biased towards rocket technology that the Soviet science of the day was unable to deliver in a timely manner, he was right about heavy tanks. The arrival of the T-62 MBT (Main Battle Tank) only a few years after the original T-10, and the imminent service introduction of the T-64 MBT with powerful next generation armament and new ammunition types, made the T-10 and heavy tanks in general effectively redundant. The T-10 tank was gradually withdrawn from service in the 1970s; however, the T-10 series was only officially removed from service by Decree of the President of the Russian Federation in 1997. As such, the T-10 outlived the Soviet state that had created it.

The T-10 chassis was also used as the basis for several specialized weapon types including self-propelled guns and missile armed tank destroyers, the 2B1 and 2A3 tracked self-propelled nuclear delivery weapons, and as the tracked chassis for the RT-15 medium range and RT-20P intercontinental range ballistic missile systems. As such, the extended T-10 family made a significant contribution to the Soviet arsenal during the latter stages of the Cold War.

CHAPTER ONE

DEVELOPMENT HISTORY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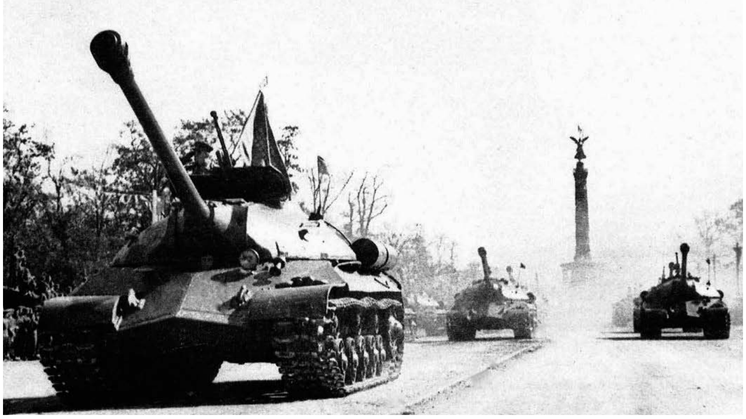
In the early 1930s, the Soviet Union laid down criteria for the development of a new and powerful tank force, broken down into six tank types: amphibious scout tanks; light tanks; infantry escort tanks; fast tanks; medium tanks; and heavy breakthrough tanks. Tanks were developed and produced in all these classes during the 1930s, but as World War II embroiled the Soviet Union in 1941, development was streamlined into three tank classes for the duration of the 'Great Patriotic War', namely light, medium and heavy 'breakthrough' tanks.

Post-war, the Soviet Union continued with the wartime concept of three basic tank types until the introduction of the Main Battle Tank (MBT) in the 1960s. The T-62 (and particularly the T-64 MBT introduced later in the decade) were provided with levels of firepower, new ammunition availability and armour protection such that their introduction rendered the heavy tank redundant, and these new MBT tanks effectively sounded the death-knell for the heavy tank.

The last Soviet heavy tank was the T-10 series, an enigmatic tank long shrouded in mystery and frustration for Western military intelligence analysts, who during the period of its operational deployment could accurately determine neither its capabilities nor its production numbers. Today, however, as Russian state archives have gradually been made available, much information has come to light that now gives an accurate history of this unique Soviet heavy tank and the many specialized variants developed on its chassis.



The IS-3's surprise appearance at the Allied Victory Parade in Berlin in September 1945 was a shock to the Allied military representatives in attendance, who, acknowledging the accomplishments of the venerable IS-2, had nevertheless not expected the war-weary Soviet Union to have a next generation heavy tank already in production.

EARLY POST-WAR HEAVY TANK DEVELOPMENTS

At the end of the 1940s, the Soviet Union had three different heavy tank types in service, namely the wartime IS-2, and the first generation post-war IS-3 and IS-4 heavy tanks. All of these tanks were deployed as 'breakthrough' tanks, intended for use with discretion to deliver a heavy blow through obstinate armoured forces or fixed defensive positions which medium, or latterly main battle tanks, could not handle. While the reliable and popular IS-2 remained a capable heavy tank, the post-war IS-3 and IS-4 intended to replace it both suffered from some significant design and construction defects, related in part to the haste with which they were designed, tested and put into series production. The deficiencies were such that both tank types were ultimately deemed inappropriate for further development.

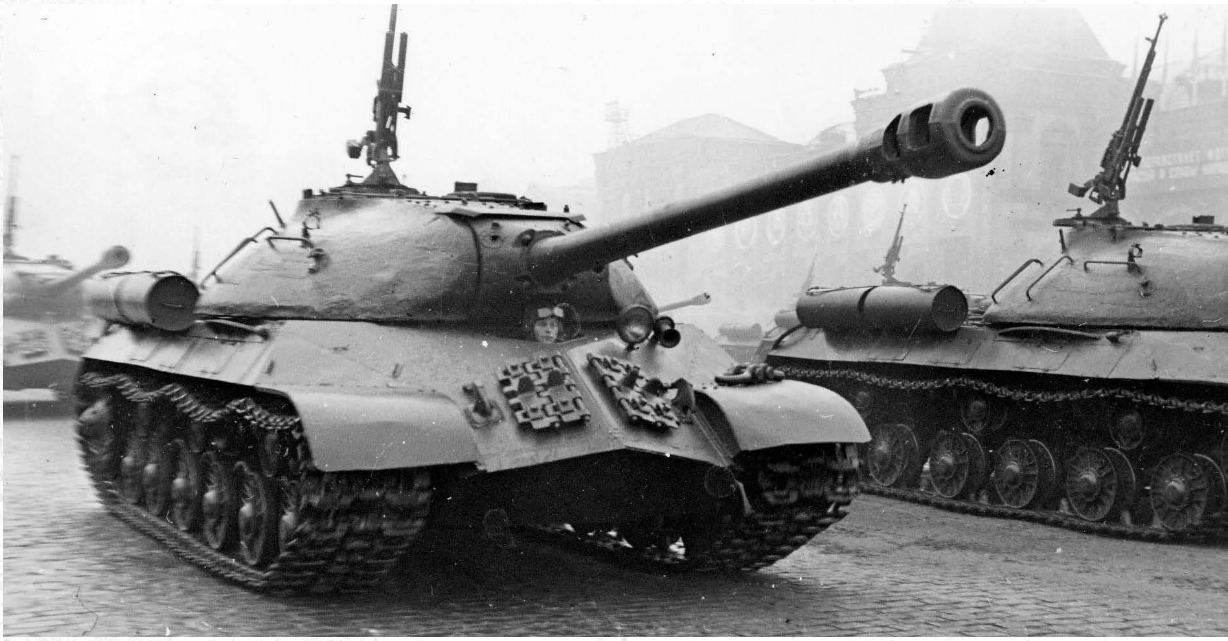
Since before World War II, Soviet heavy tank development had been dominated by the Kotin Design Bureau in Leningrad, headed by Iosef Yakovlevich Kotin, who had been assigned to this position by the Soviet Politburo in 1937. Though his initial assignment was in part due to his being a trained engineer, his wife was the goddaughter of Klimenti Voroshilov, one of the three highest ranking members of the Communist Party immediately below Stalin in the military hierarchy, which doubtless played some part in his appointment. Kotin supervised development of the multi-turreted SMK and T-100, the ultimate series production development of which was a simpler, single turret KV-1 design, which was powerfully armed and particularly well armoured but had a less than ideal mechanical design and layout that affected its overall reliability. In 1943, the Kotin bureau, now relocated to Chelyabinsk, developed the IS-85, IS-100 and latterly the IS-122, which became the venerable IS-2 heavy tank that spearheaded the final armoured assault on Berlin and ultimately secured Kotin's post-war career.

At the end of the war, the Leningrad Kirov (LKZ) Plant was re-established on its original location, which had remained intact during the Siege of Leningrad, but with the machine tooling evacuated primarily to Chelyabinsk where wartime series heavy tank production had been undertaken.

In 1944, almost immediately after the end of the Siege of Leningrad, Plant No.100 (the successor to the originally Leningrad based OKMO design bureau that was the premier Soviet research institute for armoured vehicles) was relocated back to Leningrad under the direction of A. S. Yermolayev, and again became part of the Leningrad Kirov Plant (LKZ). Post-war, Kotin had direct control over the Leningrad Kirov Plant (LKZ), the Prototype Plant No. 100, (both of which were re-established in Leningrad), and the Chelyabinsk Kirov Plant (ChKZ) that had been the wartime Soviet heavy tank production centre. The Leningrad Voroshilov Plant (No. 174), which was relocated to Omsk and re-oriented towards the production of medium tanks, was taken from Kotin's control, so that Kotin was to continue as the godfather of Soviet heavy tank design in the post-war era.

Soon after the end of the war, the majority of the design engineers who had evacuated from the Leningrad Kirov Plant (LKZ) to Chelyabinsk in 1941 and had worked on the later KV variants, the IS-2 and latterly the IS-3 heavy tank designs during the war, relocated back to Leningrad. ChKZ in Chelyabinsk (also known as Plant No. 185) remained in situ under Isaac Zaltsman as general director and Nikolay Dukhov as chief designer, with M. F. Balzhi as his deputy. At the end of World War II, there were therefore two design bureaus, two production plants and designers from the (again relocated) pre-war OKMO research institute all involved in the development and production of heavy tanks. The Leningrad based LKZ plant had the better-staffed post-war design bureau, while the ChKZ plant in Chelyabinsk retained the stronger series production facilities.

In the final months of the war, the two plants had developed alternative concepts for what would become the post-war IS-3 heavy tank. Plant No.100 (LKZ) developed the Obiekt-248 (IS-3) with a radical, sharply angled glacis design made up from intersecting interlocking steel plates, from which the tank would get its 'schuka' (pike) pseudonym, and an excellent overall ballistic shape, but a less successful turret design. Meanwhile, the ChKZ



IS-3 heavy tanks on Red Square, Moscow, 7 November 1946. The IS-3 was a shock to Western military observers when it made its public debut at the Allied Victory Parade in Berlin, but it suffered from some design defects, as did the alternative IS-4, so an urgent replacement was required.

plant in Chelyabinsk had developed the less radical Obiekt-703 ‘Pobeda’ (Victory) tank, with a more conventional hull glacis design but a radical low profile hemispherical turret. The relationship between the two rival development teams has been described by some sources as acrimonious, and certainly it was highly competitive. The rival designs were tested at the NIIBT Kubinka tank polygon, where they were demonstrated to Vyacheslav Malyshev, the People’s Commissar for Tank Production. In a decision worthy of Solomon, he ordered that the best elements of both designs be merged, using the hull with its ‘schuka’ nose from the LKZ and the radical hemispherical ‘frying pan’ turret design developed at ChKZ for the Obiekt-703 prototype. The first batch of pre-production IS-3 heavy tanks was built in the spring of 1945. Though the IS-3 did not see combat during the final stages of World War II in Europe, a batch of 52 tanks was shipped to Berlin by rail in time to appear as the Soviet surprise to Allied forces at the 1945 Victory Parade, where the radical tank caused great consternation and set emergency heavy tank development programmes in motion in the US, Great Britain and France.

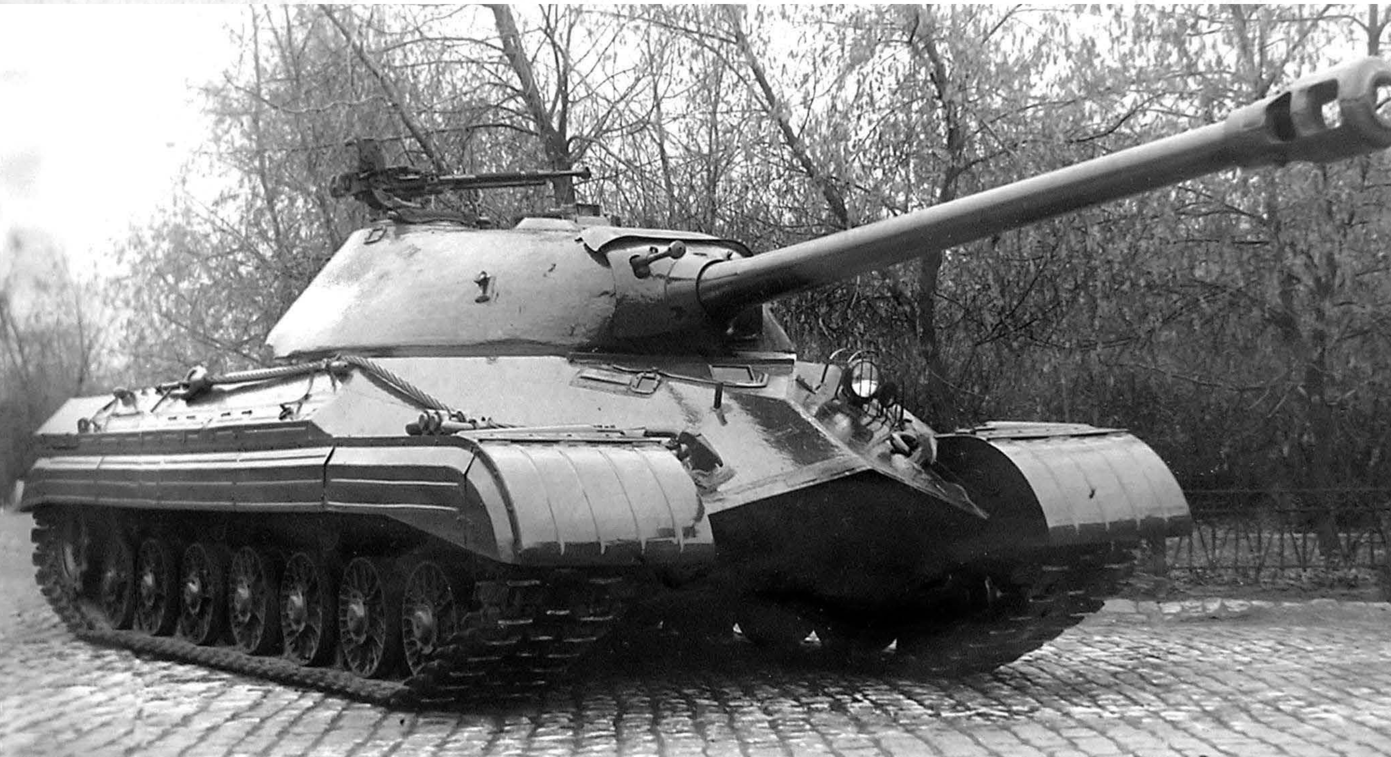
The decade within which the IS-3 eventually morphed into the T-10 as the ultimate development of the post-war IS heavy tank was one in which the scene was set for the Cold War; a period of almost frantic tank (and rocket) development in the countries of the Soviet Union and the former Western Allies. When it entered series production, the IS-3 was a development and operational risk, and as with all post-war Soviet tank designs alternative back-up designs were developed, some of which were actually more radical than the IS-3. But while the IS-3 impressed and greatly concerned Western observers, it was far from a fully matured design. The IS-3 had many advanced features beyond the ‘schuka’ nose, for instance the use of a ‘notched’ lower hull shape to reduce overall armour weight, but it transpired that the design precluded sufficiently rigid attachment of the engine mounts, and vibration caused engines to regularly dislocate from their mountings, resulting in the need for major repairs. IS-3 tanks were often sent from production directly to rebuild plants (TRZs) to remedy defects, and shipped onward to long-term strategic storage. It is for this reason that there are so few photographs of the later modified IS-3M in Soviet Army service.

Not being impressed with the LKZ design for the IS-3, the ChKZ plant under Dukhov, with the blessing of the Council of Ministers of the Soviet Union (SM SSSR), developed a new 60 tonne class heavy tank, the Obiekt-701, as an alternative to the IS-3 should the design prove troublesome in service. Six modifications of this new design were ultimately developed to varying stages of completion, with the Obiekt-701-6 ultimately taken into service with the Soviet Army as the IS-4 in accordance with Resolution No. 961-403 of the SM SSSR dated 29 April 1946. The expectation at the time was that the IS-3 would be rapidly relegated to reserve status as the IS-4 entered series production, with the IS-4 becoming the standard Soviet heavy tank of the first post-war decade.

The reasoning behind this sudden decision to terminate IS-3 production less than a year after it had started was that the IS-3 was enduring significant problems in service. The tank suffered from vibration as already described, which caused engine and transmission mountings to fracture, the turret armour cracked continually (the repairs are obvious on numerous museum exhibits) and the tank interior was particularly dark and cramped, especially for the turret crew. As a showpiece of Soviet armoured might it had proven itself, but in service it was not regarded with quite the same esteem.

It rapidly became clear, however, that the IS-4 was not without a few foibles of its own. The tank proved as troublesome to produce as the IS-3 (not surprisingly, as they were siblings from the same origins and largely from the same parts' sources) and the IS-4 ultimately proved no more reliable than the IS-3 in service. The IS-4 suffered from problems with its overstressed engine and a very noisy and fatiguing whistling from its large twin cooling fans, which was apparently audible several kilometres away when on the march.

As there was no alternative immediate solution, both the IS-3 and the IS-4 therefore continued in production on a limited scale with a view to them both now being a stopgap measure until a more reliable alternative could be developed and produced. As an indication of the difficulty in



The Obiekt-730 was developed as a replacement for the IS-3. Initially intended to enter service as the IS-5, it was subjected to prolonged testing and rework, so that it would eventually be re-designated IS-8 and ultimately enter service as the T-10. This prototype was photographed at ChTZ in September 1949.

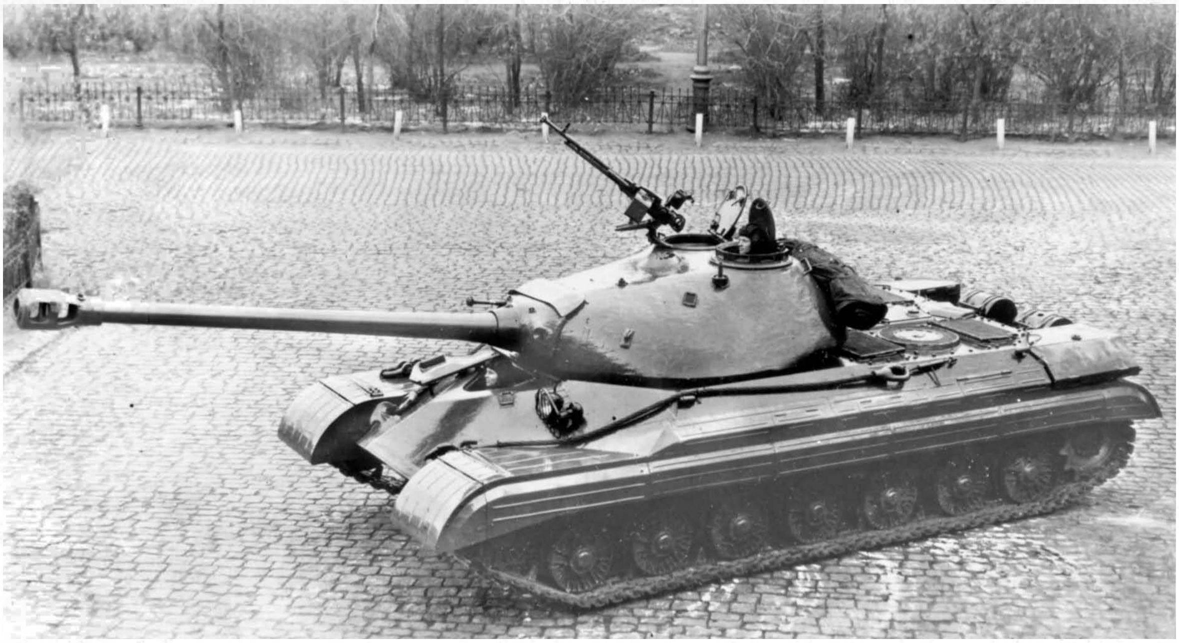
producing the new designs, a total of only 179 IS-4s had been completed by 31 October 1948. Things came to a head when on 22 March 1949 Resolution No. 701-070ss SM SSSR cancelled IS-4 production with immediate effect. All IS-4s were to be relegated to the RVGK (High Command Reserve) and subsequently served with the Far East Military District, where many were later emplaced in concrete as strongpoints on the Chinese border.

With production of the IS-4 terminated, and the known faults of the IS-3 not deemed curable (though a massively expensive refit of IS-3s to IS-3M standard was later carried out to prolong the service life of the tank), entirely new designs were needed. Design work returned to a more conventional heavy tank design, which would ultimately result in the deployment of the T-10, but not before a few oblique tangents were explored.

At the end of the 1940s, the rival design bureaus working under Kotin were now focused on three new tank concepts: an improved version of the IS-3, later to be known as the IS-5; a new heavy tank using a combination diesel engine and electric drive system, to be called the IS-6; and a highly promising (or perhaps simply startling) super-heavy tank, later known as the IS-7.

On 12 February 1946, Resolution No. 350-142ss was passed by the SM SSSR, formally instructing the development of an altogether more radical heavy tank design than the IS-3 then in series production. This was a significantly larger and (expected to be) more manoeuvrable super-heavy tank, the Obiekt-260, latterly better known as the IS-7, which was armed with 130mm main armament and with no fewer than eight machine guns. The Obiekt-260 (IS-7) was a radical tank, massively powerful, a veritable land battleship of the pre-war T-35 genre. It was armed with a 130mm naval gun, 14.5mm KPVT co-axial and anti-aircraft machine guns, two 7.62mm SGMT machine guns in the turret, two 7.62mm SGMTs hull mounted in boxes firing forward, and another two firing rearward. Power was provided by a maritime derived diesel engine developing 1050hp, giving the 68 tonne tank (three tonnes over design weight) a remarkable top speed of 59km/hour.

Though the Obiekt-260 (IS-7) was a technical masterpiece in some respects, the tank was nevertheless the heaviest tank to ever be created in steel in the Soviet Union, and it was clear from the outset that it would be difficult to series produce and reliably maintain in service. The Soviet Army high command also did not want any tank in service that weighed over 50 metric tonnes, and even with all of its innovations and advances the IS-7 was 18 tonnes over that limit. The tank was ultimately too large, heavy and technically complex to series produce and maintain reliably in service, not least because it had nothing in common with existing production tanks, with almost every component unique to the Obiekt-260 (IS-7).



The same Obiekt-730 (IS-5) prototype at ChTZ in Chelyabinsk, September 1949. The tank bears a strong resemblance to the IS-3 it was designed to replace, but has an extended chassis, a new and enlarged turret, and a modified engine and transmission arrangement.

The alternative IS-6 heavy tank was meantime essentially a test-bed tank, developed to understand how well the combination diesel engine/electric transmission system worked. During the war the Soviets had captured several 'Elefant' or 'Ferdinand' heavy self-propelled guns that the Porsche plant had fitted with this type of drive. Ultimately, though the Soviet derivative of the system worked well enough, it was deemed too complex and expensive for series production, so the IS-6 was subsequently dropped.

Fascinating though these heavy tanks were from a theoretical viewpoint, the Soviet Army required a lighter and less extreme heavy tank. With development of the pre-series IS-7 prototypes having faltered (it was ultimately abandoned in 1949), there was now no single Soviet heavy tank design in production that could be considered a long-term proposition for the Soviet Army.

In February 1948 the Main Tank Directorate (GBTU) issued design specifications (TTTs) for a less drastic future heavy tank, to be armed with the proven 122mm D-25T tank gun that had faithfully served Soviet heavy tanks since it was introduced on the wartime IS-2. It was to have the general layout and running gear of the IS-4, incorporating the complex armour layout and sharp nose introduced on the IS-3 and, most importantly, to have a maximum combat weight of not more than 50 metric tonnes.

Development of a new Soviet heavy tank was officially ordained in accordance with a resolution by the Council of Ministers of the USSR

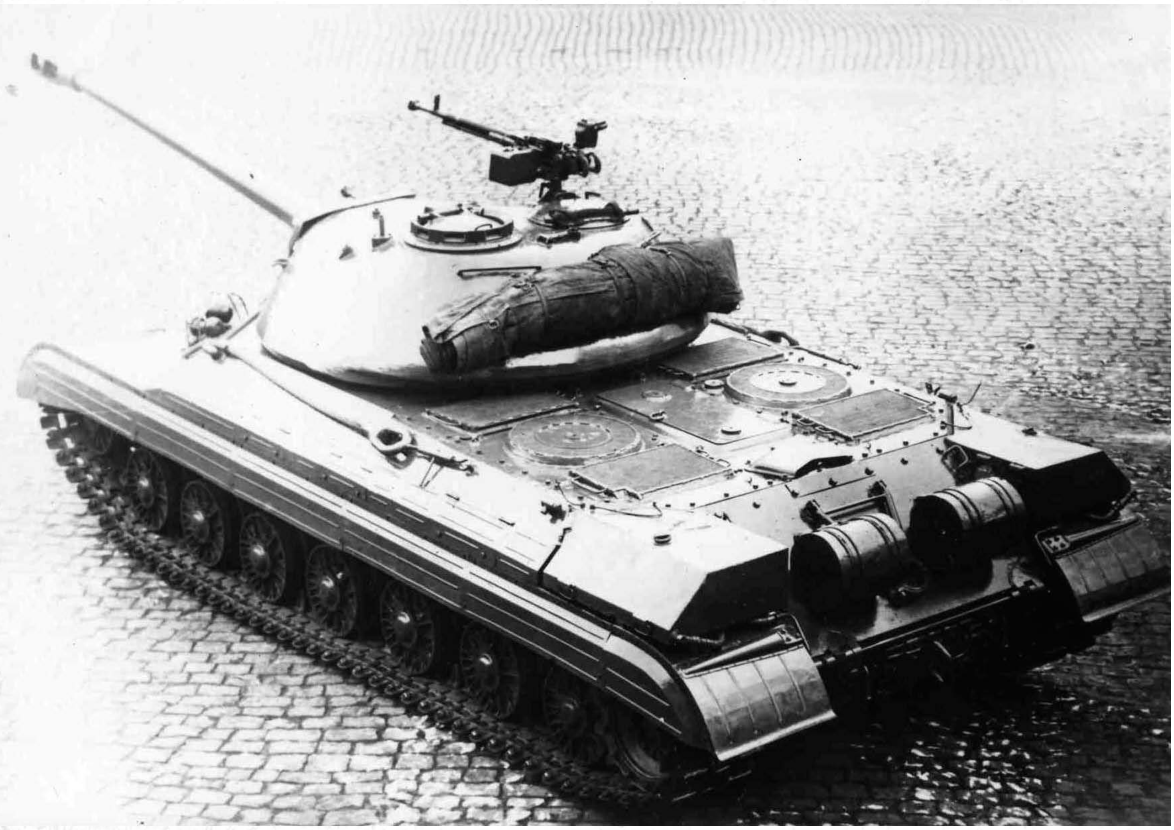
(SM SSSR) dated 19 February 1949. In accordance with the signed resolution, the design bureaus at LKZ in Leningrad and ChKZ in Chelyabinsk, in collaboration with the All-Union Scientific Research Institute (VNII-100), and all under the ultimate direction of Kotin, were tasked to develop an entirely new Soviet heavy tank under the designation Obiekt-730. The tank was initially developed with the intent that it would enter service as the IS-5; development began in 1949 and the first prototypes were completed in 1950. At the very end of prototype development in 1953, the tank latterly (and very briefly) morphed into the IS-8 and subsequently the IS-10 (T-10). This new IS-5/IS-8 tank was to be the series production alternative to the tangential IS-6 with its electric transmission and the advanced but impractical IS-7, which were both ahead of their time relative to available production capability.

Primary responsibility for development of the new tank was given to the Chelyabinsk Kirov Plant (ChKZ) located in Chelyabinsk, Siberia and its co-located KB or design bureau (KB ChKZ MTiMS SSSR) under the general direction of Kotin, but with local direction assigned to Dukhov. Design work was carried out in conjunction with VNII-100. The first director of the post-war VNII-100 institute (later VNII-Transmash) was also Iosef Kotin, the acknowledged master of Soviet heavy tank designs, having developed the wartime KV series, the IS-2 and post-war IS-3 tanks, and also much larger pre-war multi-turreted heavy tanks such as the T-100 and SMK, which ultimately did not enter series production. Kotin was in overall charge of the potential IS-5 project (as it was then known) on all levels, technical and political. From a development standpoint, the future T-10 was thereby in safe hands.

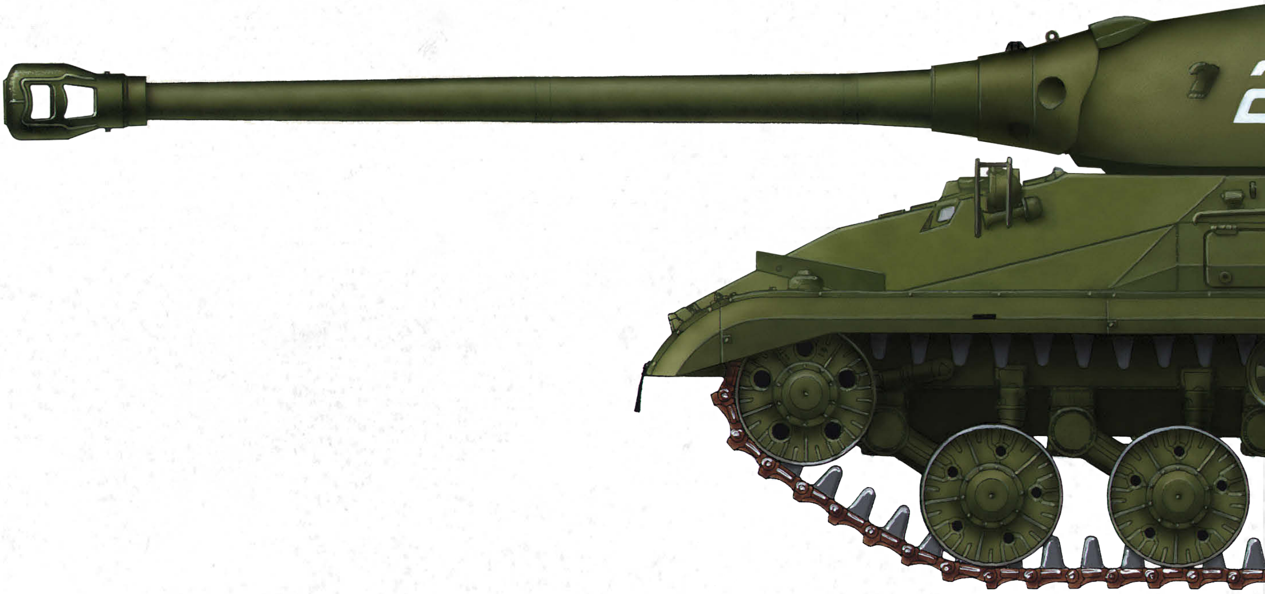
Development of the Obiekt-730 at ChKZ in Chelyabinsk was under the direction of chief designer M. F. Balzhi, who had replaced N. L. Dukhov as chief of the design bureau at Chelyabinsk in 1947. Balzhi had been one of the principal designers of the IS-3 and IS-4, and therefore well understood what to consider in the new heavy tank design as well as what to avoid. He was charged by Kotin as overall director of concept work on the new heavy tank, with A. S. Yermolayev in control of the Leningrad designers temporarily re-assigned to Chelyabinsk to develop the drawings and design plans for the new tank.

Unlike the futuristic IS-7, which pushed the boundaries of immediate post-war Soviet tank production capability, the concept behind the potential series production IS-5 was to maximize the use of existing technology and available components, so as to minimize development time and ensure the minimum of manufacturing issues of which ChKZ and LKZ had more than sufficient experience. The IS-5 was primarily a re-design of the best features of the IS-3, but with most of its most serious drawbacks corrected and improved. Work on the technical project began in April 1949.The hull, turret and armour layout were descended from that used on the IS-3 and the running gear incorporated modifications introduced on the IS-4, with some elements from the IS-7, such as the mechanically assisted loading, the (planned) bundled torsion bars and modified engine cooling. The transmissions from both the IS-4 and IS-7 were to be considered as options for the new tank.

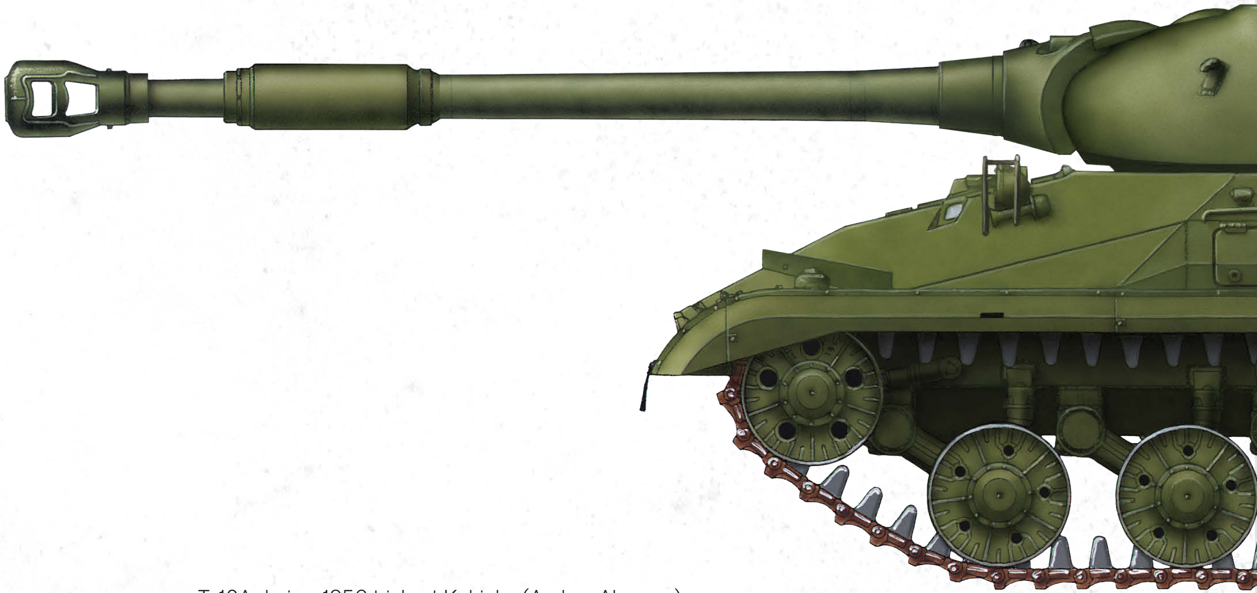
The one element of the future planned IS-5 design that remained untouched was the armament, which from the outset was accepted as the 122mm D-25T tank gun that had served the IS heavy tank series since 1944, including the IS-2, IS-3 and IS-4 production heavy tanks and a range of prototypes. Although the gun had a relatively low muzzle velocity, in keeping with Soviet practice the weapon more than made up for it with sheer projectile weight. It was well understood by the late 1940s that a new gun would soon be required, and proposed alternatives considered were the 130mm M-65 and the 122mm M-62. However, these weapons were still on the drawing board and needed time to develop and prepare for series



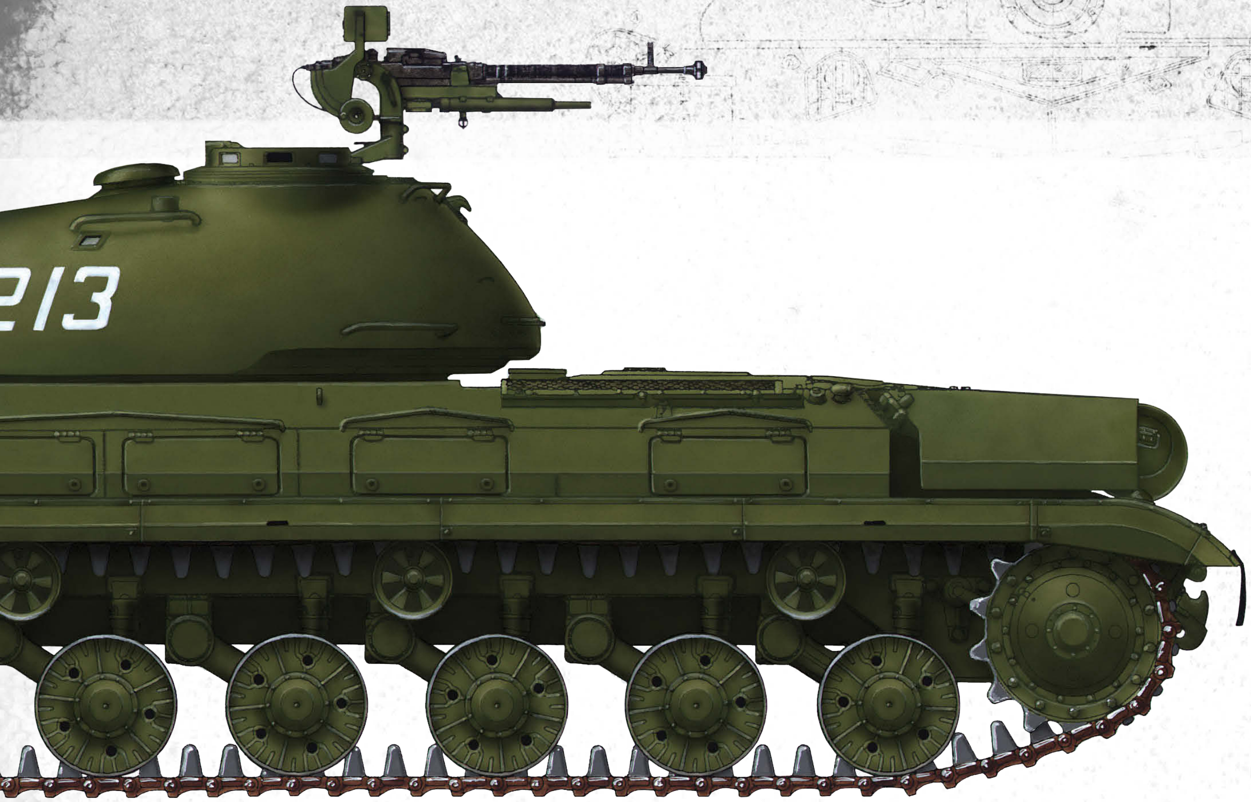
The Obiekt-730 (IS-5) envisaged a forced 'ejection' engine cooling arrangement, that was adopted on the series T-10. The Obiekt-730 (IS-5) prototype has an entirely different engine deck from the production model T-10.



A T-10 of an unknown Soviet unit (Andrey Aksenov).



T-10A during 1956 trials at Kubinka (Andrey Aksenov).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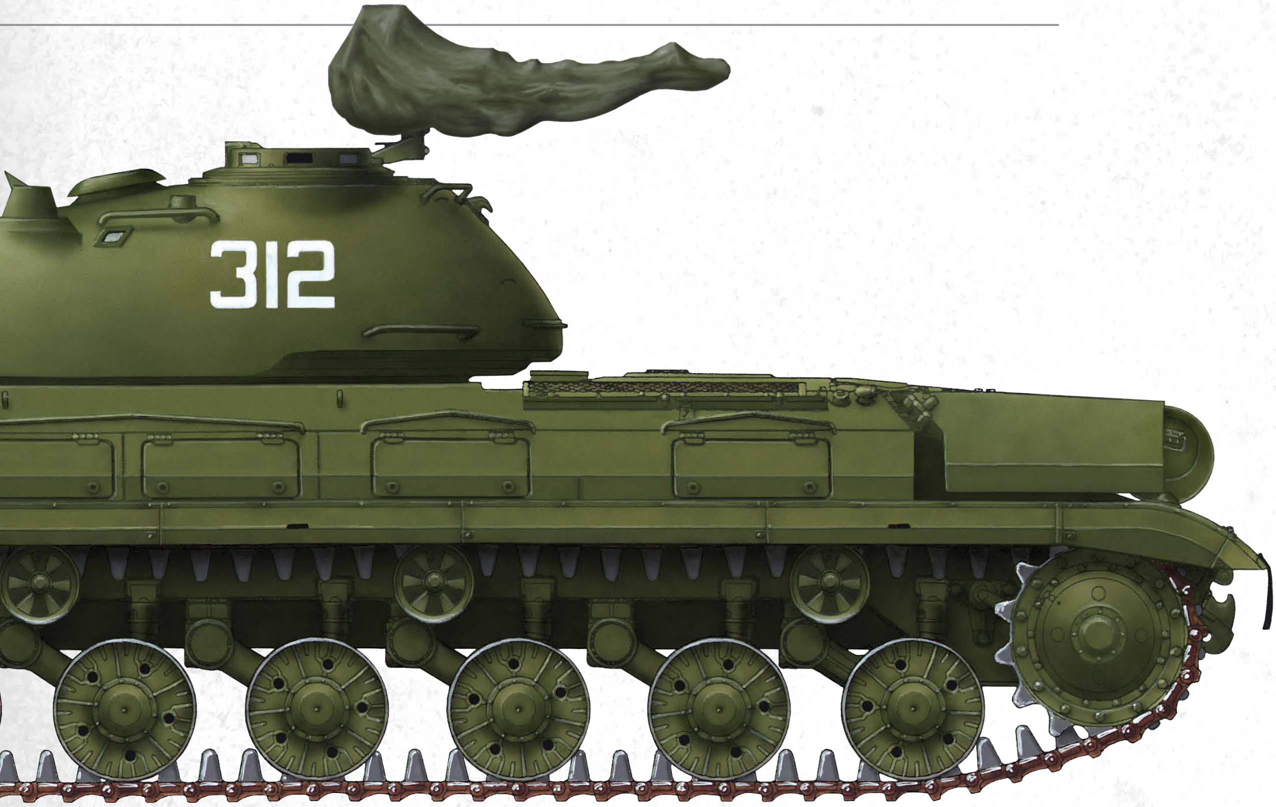
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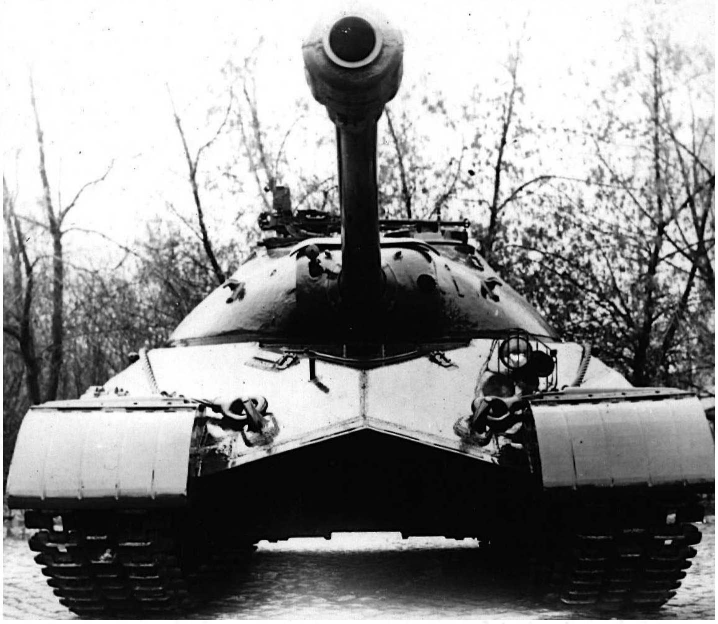


The Obiekt-730, later to become the production T-10, was from a frontal perspective almost identical to the earlier IS-3, particularly before the glacis-mounted splash deflectors were added. There are many distinguishing features, however, including the gun mantlet, the 12.7mm DShKM co-axial armament, the revised driver-mechanic's hatch and the wider track guards. The 'IS' family lineage is nevertheless clear.

production, hence the worthy 122mm D-25T tank gun was selected as the main armament for the new heavy tank.

On 20 April 1949, the technical project was reviewed by the Ministry of Transport Machine Building (MTM or MTiMS) and on 23 April by the Scientific Technical Committee of the Main Armoured Directorate (NTK GBTU). Further to this, from 25 April 1949 the design project was subjected to a three-day review by a committee headed by the Minister of the Armed Forces of the USSR, A. M. Vasilevsky.

By May 1949 a wooden mock-up of the Obiekt-730 had been built, and the design drawings together with the wooden model were again presented to MTiMS and the committee under the Armed Forces Minister on 15 May. The new design resembled a stretched IS-3 with seven road wheels, replicating the heavily sloped hull of the IS-3, and with a similar hull and turret armour layout. By 18 May, the hull and turret drawings had already been modified at Plant No. 200 in Chelyabinsk and the Izhorsk plant near Leningrad, which would respectively make the hull and turret sets for the ChKZ and LKZ plants. Engineers at VNII-100 in Leningrad meantime worked on some of their own design solutions for the projected IS-5.

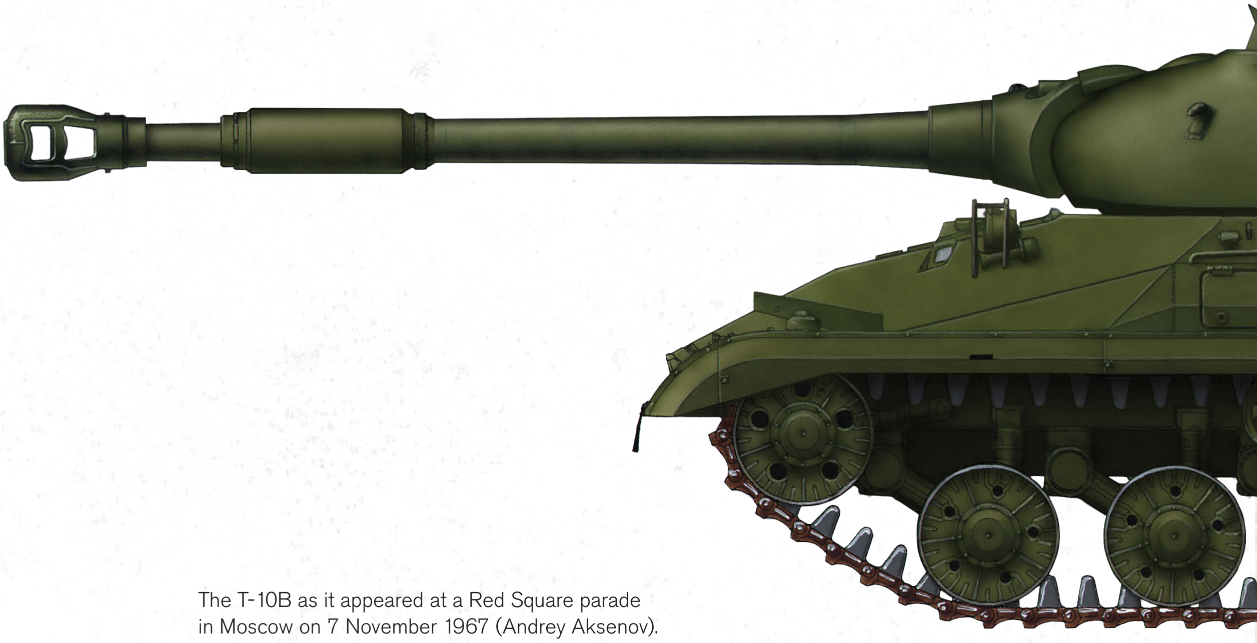
Work began at the ChKZ experimental workshop in Chelyabinsk on building the first prototype, for which ChKZ expected the first hull and turret set to be delivered by Plant No. 200 by 15 July 1949, in order to complete the first prototype Obiekt-730 only ten days later by 25 July, with three prototypes due to be completed in August. In fact, Plant No. 200 sent ChKZ the first armour set for the IS-5 on 30 July and the second set on 9 August. The pace of readying the Obiekt-730 or IS-5 for series production was nevertheless particularly rapid, in large part because of the experience already gained on the various tangents that had led to the design.

Keeping the tank within the specified 50 metric tonne combat weight proved difficult, and there were design conflicts over some elements such as modifications to the torsion bar suspension, but plant testing of the prototype was ultimately successful and ChKZ was instructed to produce a pre-production trials batch of ten tanks.

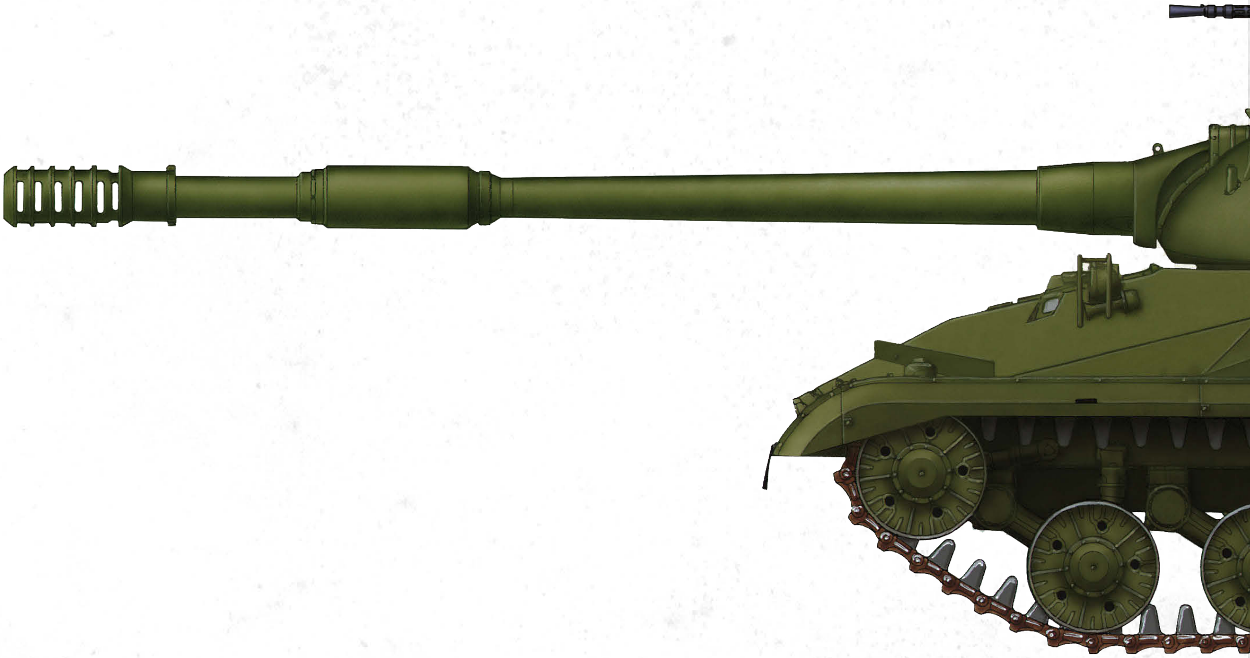
Kotin desperately wanted his new tank to be the premier Soviet Army heavy tank, and as such pushed for a high cost, no compromise development programme. This brought him into conflict with more pragmatic individuals such as Isaak Zaltsman, who had successfully managed the plant at Chelyabinsk since the early days of the 1941–45 Great Patriotic War. They clashed on many design issues, an example being the torsion bar suspension. For the T-10, Kotin wanted a new concept of 'bundled' torsion bars with a large number of smaller diameter torsion bars twisted together to form a single assembly in a similar manner to that used on large diameter steel cable. Zaltsman disagreed on the basis that the torsion bars used in the IS-2 and IS-3 had been perfectly acceptable and retained significant latent additional torque and weight bearing capability. Following the basic engineering principle of not fixing things that are not broken, he therefore saw no need to adopt the more complex (and expensive) technology. The torsion bar debacle was one of many issues where Zaltsman argued with Kotin about what he felt were other needless diversions and expenses for the new tank design.

Their differences of technical opinion were ongoing, but unfortunately for Zaltsman the Soviet Union back then, as with the Russian Federation today, was run on 'connections', and particularly during Stalin's premiership arguing with 'connected' people was generally an unwise pastime. Due to his family status Kotin was particularly well 'connected', and in early 1949 Zaltsman was called to Moscow by the Politburo, nominally to explain why he had insulted Stalin by not sending him an 'appropriate' gift on his pending 70th birthday on 18 December 1948. The situation continued to deteriorate for Zaltsman, and in September 1949 he was removed from his post as plant manager in Chelyabinsk and sent to run a small plant in Siberia that manufactured tank tracks, a significant demotion. Kotin in turn placed a less argumentative plant manager in Chelyabinsk and the tank proceeded with development more in accordance with Kotin's wishes and demands.

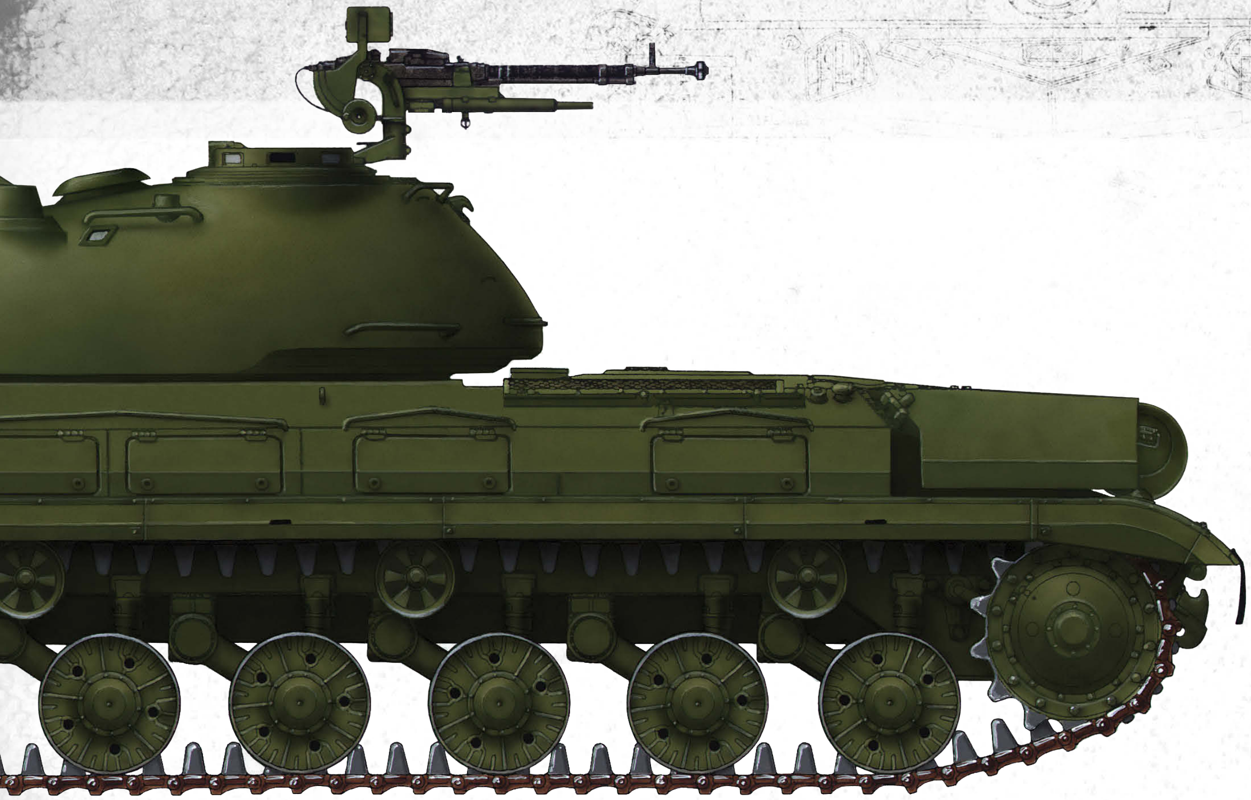
Zaltsman's removal from office 'surprisingly' coincided with the Obiekt-730 prototype's coming of age at ChKZ. Mobility trials with the first prototype Obiekt-730 were undertaken near the ChTZ plant from 22 September 1949, at exactly the same time as Zaltsman was transferred to his new position, with work continuing under the direction of Kotin as overall chief designer and Skachov as plant director. The prototype covered 1,012km during the trials, 50 per cent on made roads at an average speed of 27–31km/h and the rest on tracks and open terrain including marshes. As expected, the trials resulted in a list of defects to be remedied, and also in Kotin supporting the use of an

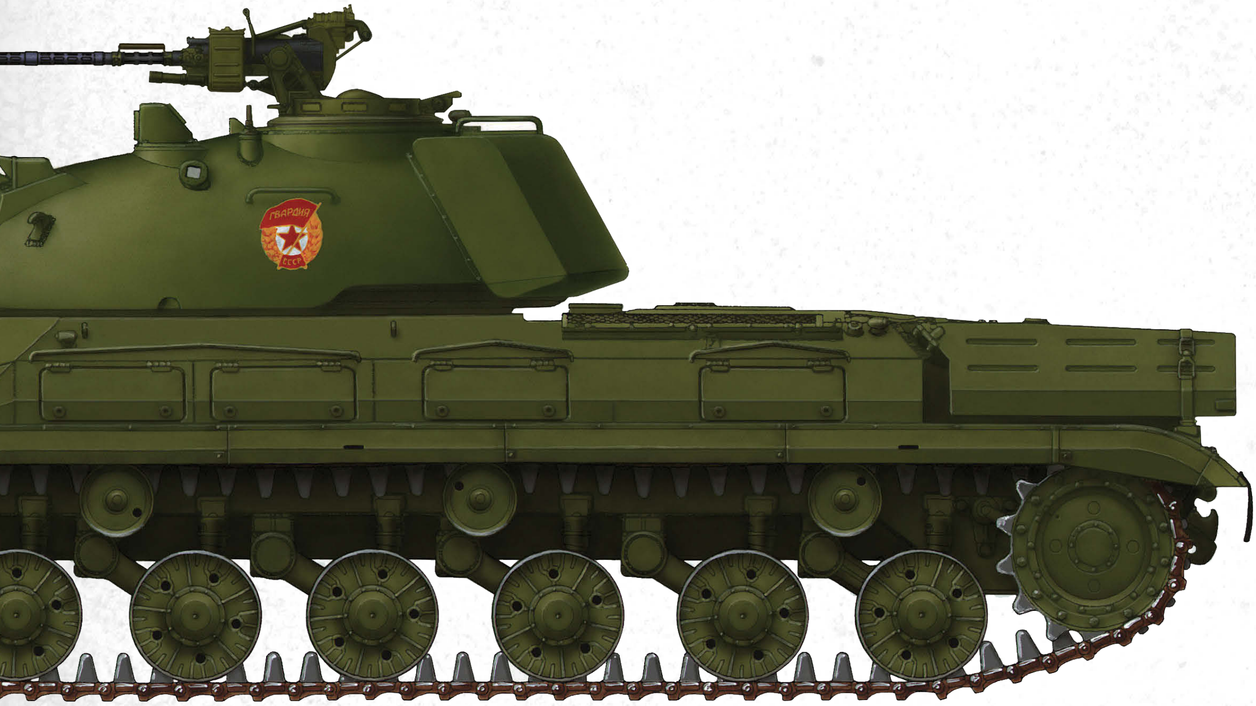


The T-10B as it appeared at a Red Square parade in Moscow on 7 November 1967 (Andrey Aksenov).



A T-10M of the 13th Heavy Tank Division GSFG, as it appeared at a parade in Dresden, German DDR (Andrey Aksenov).

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8-speed planetary transmission and forced air circulation cooling for the engine. The test report was sent to MTiMS on 13 October 1949.

Meanwhile, after various modifications beyond the MTO engine compartment had been completed, the new tank underwent final plant testing in late 1949, followed by state trials at the NIIBT Kubinka tank polygon held in April–May 1950, where three prototypes were evaluated. The tests were deemed successful, and the testing commission recommended the Obiekt-730 for series production after some minor reworking of the engine, primarily to increase power output, and minor modification to the transmission arrangements. Meanwhile in the summer of 1950 prototype trials were undertaken in the Mari region of Soviet Turkmenistan to ensure the engine and mechanical arrangements would pass state guarantee requirements.

The successful outcome of the initial trials led to ChKZ being instructed to build an 'ustavlennaya partiya' (Establishment Lot) of ten pre-production tanks in the autumn of 1950. These tanks underwent further state trials in October–November 1950, followed by long-term plant and service trials conducted in 1951–52, only completed in December 1952 due to the various prototypes being subject to constant testing, rework and modification. Meanwhile, LKZ sent an additional 35 engineers to Chelyabinsk to prepare for series production expected to start at ChTZ in 1954.

Nominally, in late 1952 the Obiekt-730 was being prepared to enter series production some months later, initially at Chelyabinsk, as the IS-5 heavy tank. The tank continued to undergo various detail changes during its final months of development, however, which resulted in a change in designation to IS-8. The new Obiekt-730 tank should have been accepted for service with the Soviet Army in the spring of that year; however, Stalin died on 5 March 1953, following which there were delays in all manner of activities in the Soviet Union, including in the introduction of the new heavy tank. The IS-8, which might have been the service designator for the final modification of the IS-5 as accepted for service, thereby morphed briefly on paper into the IS-9 and was ultimately taken into service – as the T-10 rather than IS-10 – in accordance with a resolution of the Council of Ministers (SM SSSR) dated 28 November 1953 and a subsequent order of the Soviet Ministry of Defence (MO) dated 15 December 1953. In the months between Stalin's death in March and the state decisions taken at the end of the year on the new tank's service entry, the Soviet Union had begun a process of rapid de-Stalinization, and the new tank, which had been re-designated the Iosef-Stalin 10 (IS-10) during the delays, was therefore de-Stalinized and designated T-10 in the November 1953 resolution. The T-10 entered Soviet Army service simply as the 'Tank-10' or T-10 rather than bearing the name of the former Soviet leader as all its forebears had done.

Series production of the initial production model T-10 began at ChKZ in Chelyabinsk in 1953 and continued there until 1956, with only 205 tanks being built at ChKZ during that time. Later models of the T-10 series would be produced at both ChKZ and LKZ. The planned production, and that assumed by Western intelligence agencies, was on a far larger scale, with an expected output of 1,830 T-10 tanks annually. In reality, ChKZ had built 15 Obiekt-730 prototypes in 1950 and 1951, but managed to complete only 20 series production tanks in 1954, and only 190 series production T-10 tanks were built in total between 1954 and 1956.

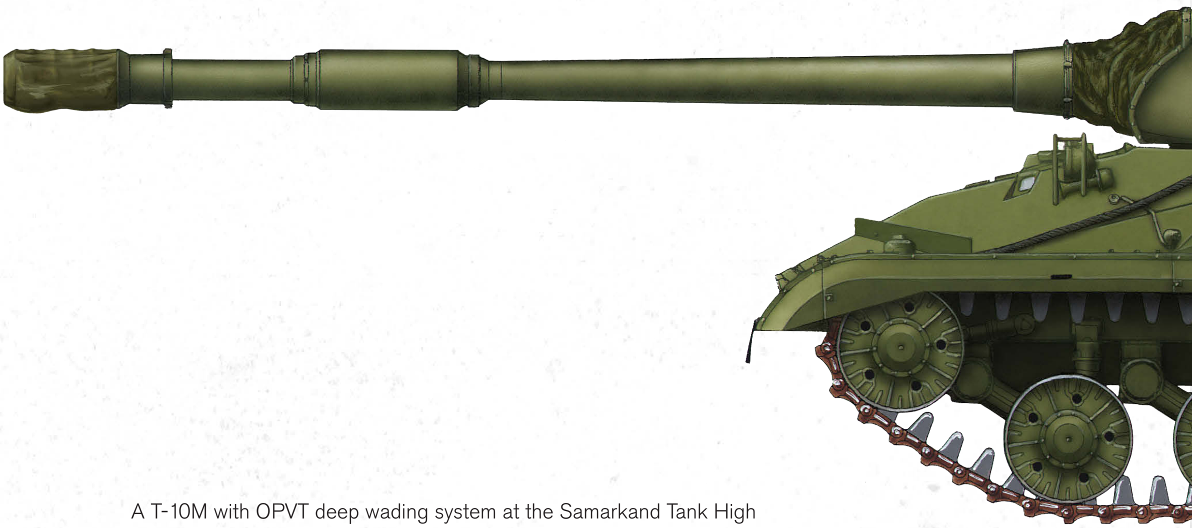
When it entered service, the T-10 tank had a combat weight of 50 tonnes, exactly as per the original Taktiko-Tekhnicheskie Trebovaniya – Tactical Technical Requirements (TTTs), though this would increase slightly over time. The original T-10 could travel at an entirely reasonable maximum of 42km/h, with a range of 230km. Power to weight ratio was a respectable 13–14hp/tonne, and ground pressure a modest 0.77kg/cm^2. The T-10 therefore entered production as a general service heavy tank with excellent characteristics for its time, far removed from its massively complex design predecessor, the IS-7. The T-10 was to become the default post-war Soviet heavy tank, and admirably fulfilled that role. As history would show, it would also fulfil the role of being the last Soviet heavy tank.

T-10

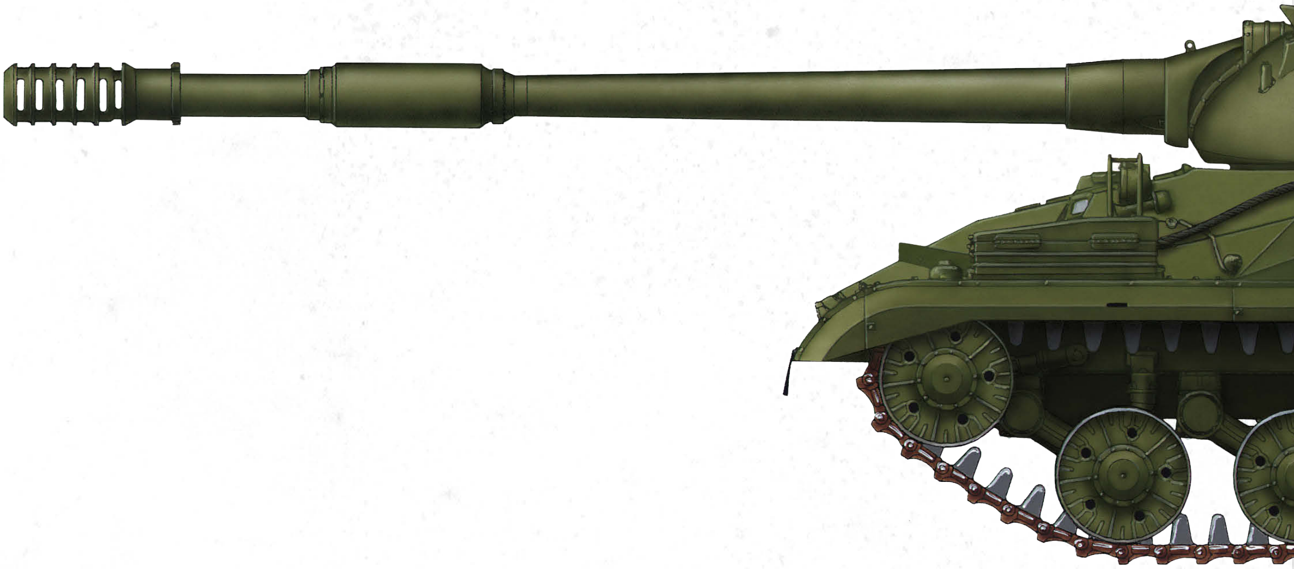
The initial production model T-10 was manufactured in relatively small numbers compared with the later T-10M. In total only 205 of the original T-10 were produced, which is nevertheless more than the combined production of later T-10A and T-10B models prior to introduction of the significantly more numerous and definitive T-10M. The early T-10 is recognized by its smooth gun barrel without bore evacuator and by the absence of the additional sighting and night fighting equipment found on later models.

T-10A (OBIEKT-731, OBIEKT-267sp1)

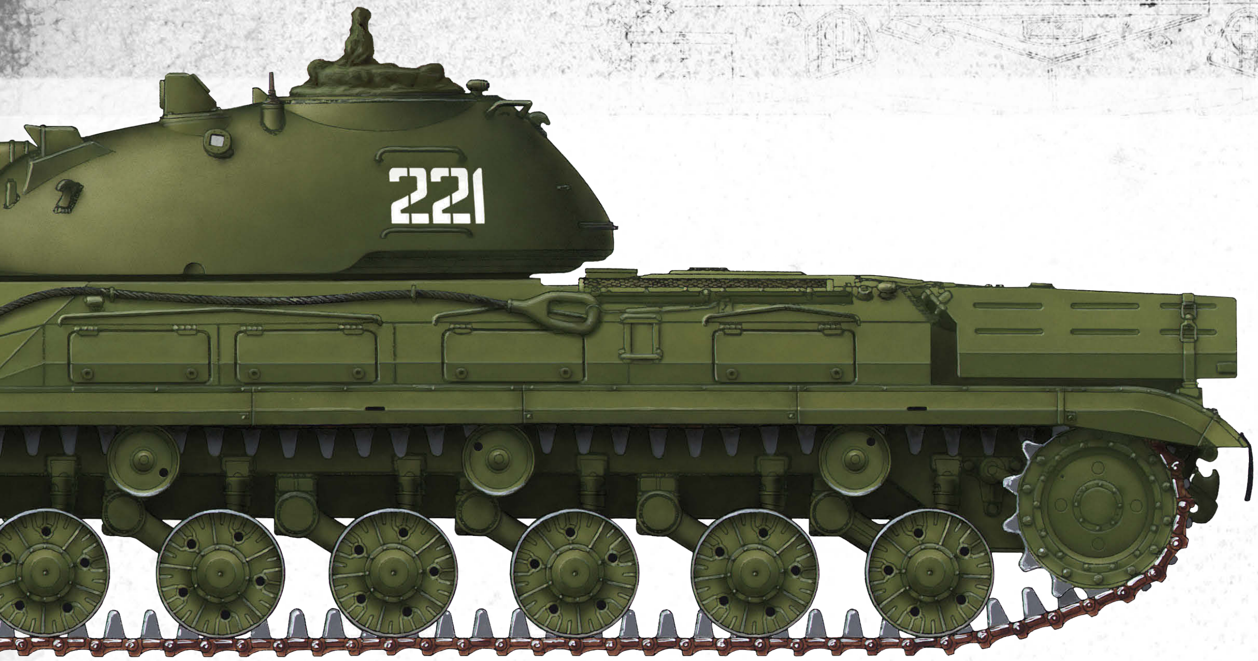
The first major modification of the base model T-10 heavy tank was the T-10A, which introduced modifications including vertical gun stabilization



A T-10M with OPVT deep wading system at the Samarkand Tank High School, Uzbekistan, 1970 (Andrey Aksenov).



A T-10 MK command tank of the 95th Heavy Tank Regiment, 9th Tank Division, 1st Guards Tank Army, Plzen, Czechoslovakia, 1968 (Andrey Aksenov).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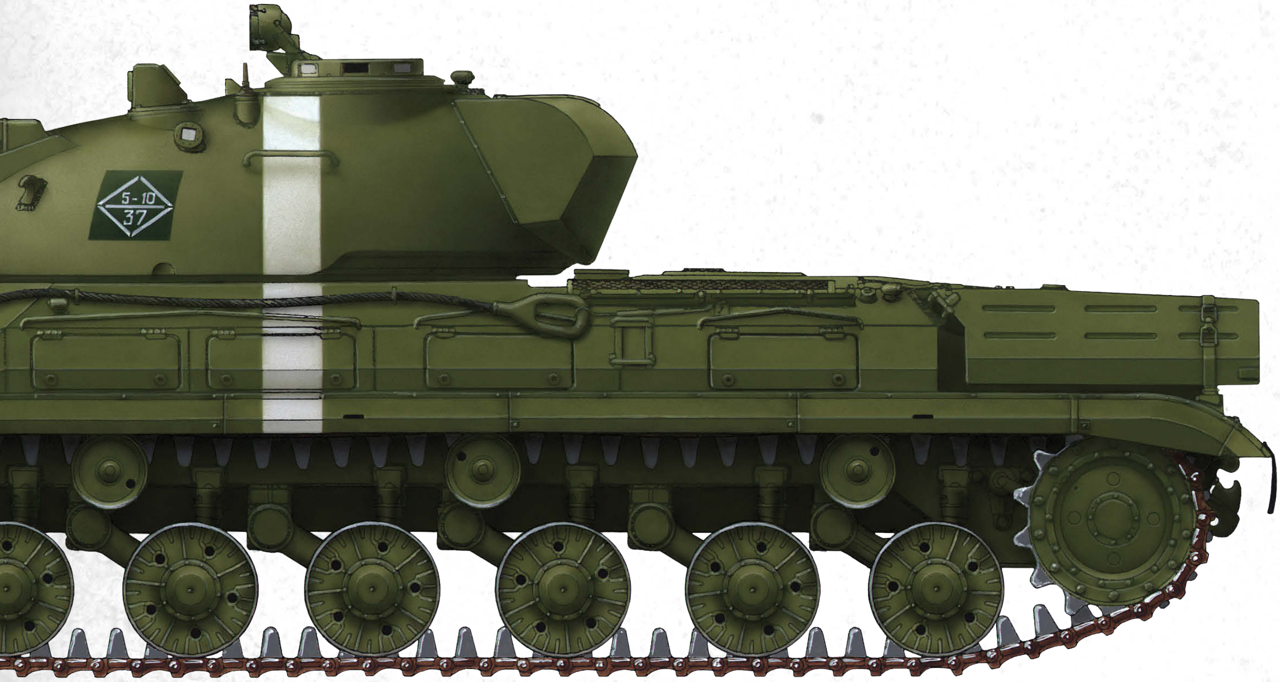
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and the fitment of a bore evacuator on the barrel immediately behind the double baffle muzzle brake.

During the Great Patriotic War the Soviet Union had received quantities of American M4 medium tanks fitted with gun stabilization systems, and Soviet testing of these systems had shown markedly improved gunnery with tanks on the move. In the immediate post-war years, the introduction of gun stabilization systems had nevertheless not been a major Soviet priority, but by the 1950s Soviet tank designers began designing and experimenting with gun stabilization systems for their medium T-54 and heavy T-10 tanks.

The first Soviet designs focused on vertical axis stabilization, holding the gun on target when moving in the vertical plane. In 1954 the 122mm D-25T tank gun was modified as the D-25TS and provided with vertical axis gun stabilization, the PUOT-1 'Uragan' (storm) fire control system and mechanical assisted loading. Meanwhile, work continued on improving the tank's fire control system with prototypes such as an Obiekt-267sp1, developed in 1954 and 1955 at LKZ in Leningrad. The Obiekt-267 was fitted with the TPS-1 optical gyroscope gun sight (in lieu of the standard TSh-2-27 periscope gun sight) and a secondary stereoscopic TUP-21 direct fire sight. The TPS-1 was introduced on the production T-10A. The gun laying was assisted by the TAEhN-2 electric drive mechanism, which gave variable turret traverse speeds of up to 14°/s.

The modified D-25TS armament with vertical gun stabilization was incorporated as a production modification at ChKZ under the designation Obiekt-731. Other improvements included the introduction of a TVN-1 night vision device for the driver-mechanic and the installation of a GPK-48 gyrocompass.

The armour, engine, transmission and ammunition complement were unchanged from the base model T-10, but the internal fuel tanks were modified, which resulted in an additional fuel reserve of 180 litres being located under armour.

The Obiekt-267/Obiekt-731 was accepted into service with the Soviet Army as the T-10A on 17 May 1956, but it would be produced only in small quantities (only 50 in total) before being replaced by the similarly short-lived (in production terms) T-10B variant. The ChKZ plant referred to the tank as the Obiekt-731, the LKZ plant as the Obiekt-267. The most significant distinguishing feature of the series production T-10A was the bore evacuator mounted close behind the double baffle muzzle brake.

The T-10A was used as the basis for several experimental prototypes. In 1958 the TDA exhaust oil injection smoke generation system was fitted on a modified T-10A at the Kubinka polygon and tested between 1958 and 1959, with the system being thereafter introduced on production tanks. A prototype fitted with the OPVT deep wading snorkel system as later mounted on the T-10M was tested at the Kubinka polygon, and the system was also subsequently made available for production T-10 tanks. Prototypes were also tested with the ambiguously named PST, literally 'amphibious transport means', which was a T-10 fitted with amphibious floatation and propulsion devices, as also tested on Soviet MBTs including the T-55 and T-62.

Some early T-10 and T-10A tanks were modernized to T-10B standard during capital rebuilds, so that as with most Soviet tanks they often have a combination of early and late features.

T-10B (OBIEKT-733, OBIEKT-267sp2)

As Soviet technology advanced, tank designers developed twin-axis (vertical and horizontal) gun stabilization, and this was also fitted to the T-54 and T-10 tanks. The T-10A was further modified as the T-10B, fitted with the PUOT-2 'Grom' (thunder) two-axis gun stabilization but retaining the TPS-1 main gun sight introduced on the T-10A. Other upgrades on the T-10B included the provision of full infrared (IR) night vision equipment for the armament and driver-mechanic, and the installation of an improved R-113 VHF FM radio transceiver. The new modification was taken into service with the Soviet Army in 1957 as the T-10B. The tank was produced only in that year, with a total of 110 being built, though some T-10 and T-10A tanks were later partially upgraded to T-10B standard.

T-10M (OBIEKT-734, OBIEKT-272)

It was becoming apparent by the mid 1950s that the T-10 series, only recently introduced into service, was in danger of falling behind Western designs, particularly with regard to firepower and accuracy of fire. As a result, a significant re-design of the tank was undertaken, which involved the installation of a new gun, sights and gun stabilization system mounted in a modified turret, together with other less radical changes.

Design work on the T-10M began in 1956 at LKZ in Leningrad, under the designation Obiekt-272. The dramatically modified tank was accepted for service by order of the Soviet Ministry of Defence (MO) of the USSR on 26 September 1957 and entered series production at both LKZ in Leningrad and ChKZ in Chelyabinsk from 1958. The T-10M would become the definitive model of the T-10 series, remaining in production at LKZ until

1962 and ChKZ until 1964. From 1962, the ChKZ and LKZ plants both built T-10Ms in accordance with the drawings of the Obiekt-272 due to operational problems with field repairs on the original T-10M tanks produced by the two plants, which had many variances in design and components and used entirely different part numbers.

The T-10M was the subject of considerable controversy during its early development and preparation for series production. The two plants had (often caustic) differences of opinion over the specifics of the T-10M, and the respective Obiekt-272 and Obiekt-734 variants had a number of differences as they entered series production in Leningrad and Chelyabinsk. This led to problems in service, as many parts were not interchangeable between the variants, which caused problems with repairs. A similar problem had arisen during the war with the T-34, which at one point was under production at five different plants. In order to rectify the situation, Aleksandr Morozov, chief designer at Plant No. 183 (Nizhniy Tagil), demanded that he be the only one to certify the plans and details of the tank in order to ensure standardization. Moscow agreed and from that point on all T-34 parts were made interchangeable. The situation was repeated with the two T-10M variants, as a result of which from 1962 only the Obiekt-272 was built at ChTZ. A brief perusal of any plant and parts drawing shows clearly the supply chain difficulties of operating two production specifications and two spare parts lists for the same tank type, which highlights a background issue important to the T-10M's overall operational effectiveness.

The new T-10M variant was armed with the new and significantly more powerful 122mm M-62-T2 (2A17) tank gun, which was initially installed on the LKZ developed Obiekt-264 prototype in 1964 for development trials, while the Obiekt-265 was developed at LKZ to test the alternative 122mm D-25TEh gun with new high velocity ammunition types and a bore evacuator system. Secondary armament consisted of 14.5mm KPVT co-axial and anti-aircraft machine guns that replaced the 12.7mm DShKMs of the earlier production model. The co-axial 14.5mm KPVT was mounted to the right of the main armament, while the turret mounted 14.5mm KPV heavy machine gun was mounted on a PZU-7 rotating mount on the turret roof. Due to their bulk and also expense, only one in five tanks was fitted with the anti-aircraft gun mounting. Note that Soviet weapons systems were developed using a standardized set of ballistic tables and that most early Soviet gun sights were based on standard designs with specific reticules inserted in them to provide for those tables. The ballistics table for the D-25T series of guns was Table 27; that of the M-62-T2 was Table 29. The same was true of the machine guns – the DShKM used Table 11 and the

KPV used Table 14. Thus a TPS-1 sight suffixed 27-11 is set for use with a 122mm D-25T series gun and a 12.7mm DShKM machine gun; the TPN-1-29-14 is set to use the M-62-T2 gun and KPV machine gun.

The T-10M had an increased combat weight of 51.5 metric tonnes. To counter the additional combat weight, the engine power output was increased to 750hp, thereby increasing the power to weight ratio from an initial 12.5–13 to 14.6hp/tonne, while also increasing maximum speed to 50km/h and range to 350km. The ground pressure remained 0.77kg/cm^2.

The 122mm M-62-T2 tank gun was developed at Plant No. 172 in Perm, firing rounds with higher ballistic properties and with a muzzle velocity of 950m/s. The gun featured the two-axis 2Eh12 'Liven' (shower) gun stabilization system and T2S-29-14 two-axis stabilized gun sight. The armament was fitted with an electromechanical rammer for the separate loading ammunition. HE-FRAG (high explosive fragmenting) and AP (armour piercing) rounds were provided, the AP round having an armour piercing capability of 250mm at 1000m. A 'cumulative' projectile (HEAT, high explosive anti-tank) was added in 1964 and in 1967 the tank was provided with sub-calibre (APFSDS, armour piercing fin stabilized discarding sabot) rounds; the gun also was provided with semi-combustible propellant casing charges as used in the new T-64 tanks at that time.

The new tank was technologically a quantum leap ahead of the earlier T-10 production models; however, its complexity added frustration for its crews. Whereas the T-54B tank with its two-axis stabilizer had a simple 'point and shoot' function, in that the gun would fire when its aim point in space lined up with where the sight was aimed, the T-10M had a two-axis stabilizer for the gun and a separate two-axis stabilizer for the T2S-29-14 sight, which required considerable dexterity on the part of the commander and gunner. This sighting system also required special training for the gunner: he had to acquire the target, press and hold the firing button, and wait for the gun stabilizer and sight stabilizer to come into agreement before the gun would fire. During testing it was found that this could take as long as 30 seconds, and on occasion the gunner would move the sight before the target was engaged, with the gun then firing off in a different direction. While the T-10M used this sight throughout its service life, it was far from 'point and shoot', and the design was not repeated in later tanks.

The T-10M was provided with a TKN-1T night vision periscope for the commander and a TPN-1-29-14 night sight located in a mount in front of the commander's hatch on the turret roof. Infrared (IR) searchlights were provided for the gunner and commander and an IR FG-100 headlight for the driver-mechanic.

From 1958, work was conducted at VNII-100 on providing additional radiation protection for the T-10M, with radiation liners and a PAZ overpressure system being introduced on later T-10Ms produced at both ChKZ and LKZ. The primary test-bed vehicle for these experiments was the Obiekt-756.

From the summer of 1959 until 1963, experiments were conducted on the use of radio-location rangefinders (e.g. radar gun sights). These were mounted on several tank types including the T-10M, and tested at the artillery polygon in the Leningrad military region (LVO).

In total, 1,079 T-10M tanks were built, which makes the T-10M by far the definitive production model of the T-10 series. The earlier T-10, T-10A and T-10B were upgraded during service but not to T-10M standard, as the latter was effectively an entirely different tank.

T-10MK COMMAND TANK

As with all major post-war Soviet tank types, a dedicated command version of the T-10 series was developed. While there may have been command (K suffix) models of the earlier T-10, T-10A and T-10B tanks, there is no information as to how they would have been equipped.

A Soviet post-war command tank was designed to provide both communications within its specific unit (company, battalion or regiment) and also with higher echelons, and to that end battalion and regimental tanks were provided with an HF (high frequency) AM radio with a mast antenna for use when at the halt to increase communications range. They were also fitted with additional navigation equipment and a separate small generator to power the radios when the main engine was shut down.

The T-10MK command tank was designed to meet these criteria and was developed at the OKBT design bureau at LKZ in Leningrad in 1957 on the basis of the T-10M, under the direction of Iosef Kotin, using the plant index Obiekt-272K. The tank was series produced at LKZ in Leningrad from 1959 to 1962 and at ChTZ* in Chelyabinsk until 1964, with a total of 100 T-10MK command tanks built.

The T-10MK was fitted with the R-113 VHF FM radio set as well as an additional R-112 HF AM radio with a 10m telescopic radio antenna, and also mounted a TNA-2 land navigation system. With the 10m antenna erected, the T-10MK had a transmission range of 40km using voice communications and 100km using Morse code. The TNA-2 land navigation system included among other elements a GPK-52 gyrocompass, a course plotter and an RT-200TS control system. A two-stroke air cooled AB-1-P-30 auxiliary power unit (APU) developing 1.5kVt (2hp) provided power for the additional electrical equipment, with its 8 litre fuel tank providing a minimum four hours of independent power. Due to the additional communications and navigation equipment installed, the ammunition complement was reduced by eight rounds, so there was now a total complement of 22 rounds.

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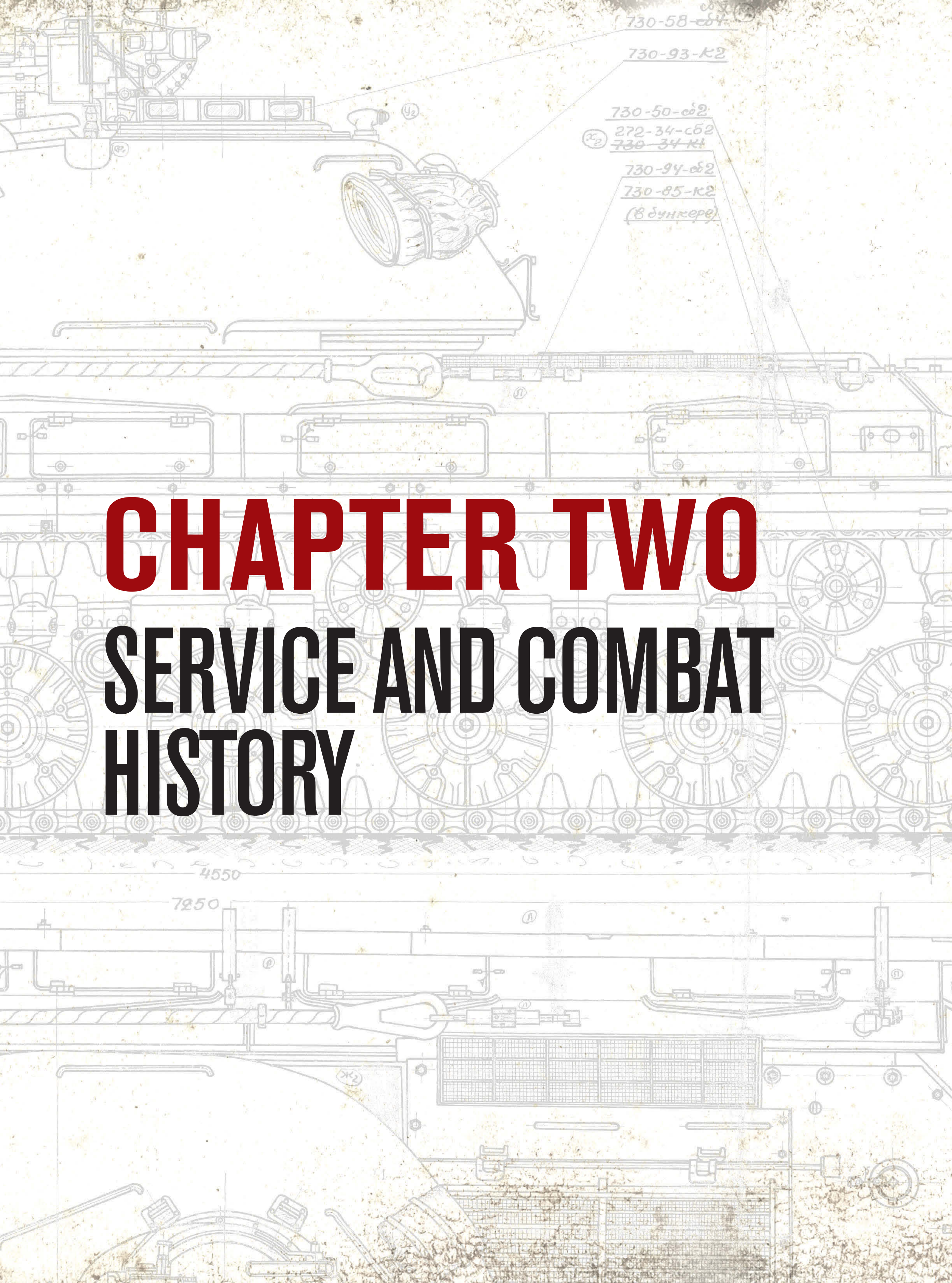
* The ChKZ plant in Chelyabinsk was renamed ChTZ on 15 May 1958, hence the conflated designations depending on the year under discussion.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CHAPTER TWO

SERVICE AND COMBAT HISTORY

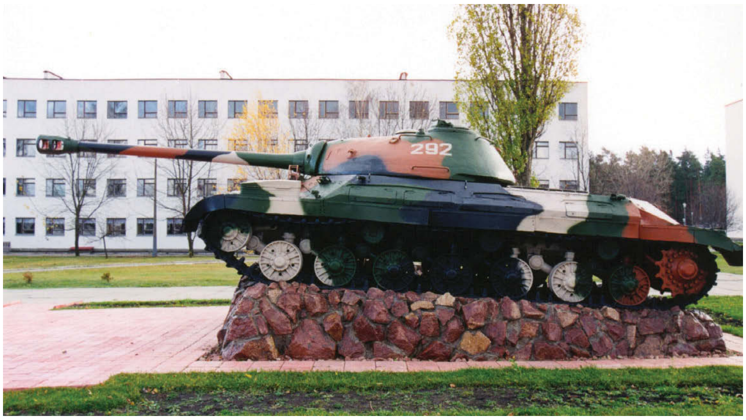
T-10 IN SOVIET ARMY SERVICE

The T-10 was a 'domestic' tank, intended for use only by Soviet tank forces and not intended for export beyond Soviet control. The T-10 served only with the Soviet Army, within the territory of the Soviet Union and with the Group of Soviet Forces (GSFG) in East Germany. In contrast to Soviet medium and MBT designs, it was not exported to any of the Warsaw Pact nations. In service, the T-10 series was generally reliable if technically complex and expensive to maintain, and did not suffer from the mechanical reliability and armour cracking issues that had afflicted the earlier IS-3.

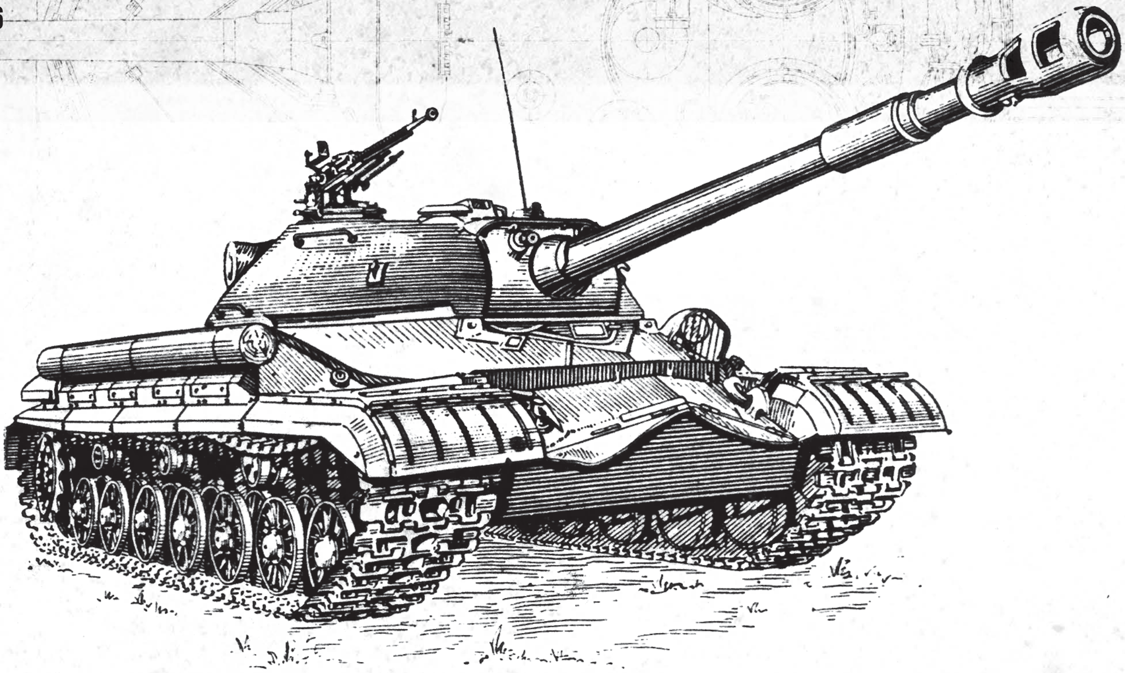
For its early career the T-10 was integral to Soviet heavy tank divisions, each equipped with two regiments of heavy tanks and one of medium tanks. Two such divisions operated with the GSFG in East Germany, the 13th Guards (Bobruisk-Berlinskaya Red Banner Order of Suvorov) Heavy Tank Division within the 1st Guards Tank Army, and the 25th Guards Red Banner Tank Division with the 2nd Guards Tank Army, with later changes to divisional nomenclature, which would become relevant when tracing T-10M movement during the tank's sole operational deployment in 1968.

PUBLIC DEBUT

The T-10 was always somewhat shrouded in mystery during the Cold War. The first T-10 tanks were delivered to operational units of the Soviet Army in 1955 and 1956, with the 7th Armoured Division of the 5th Army and the 42nd Guards



This T-10, today located within the Ukrainian tank base at Goncharovskoe, has the definitive features of the initial production T-10, with a clean gun barrel without bore evacuator and also without the later TPS-1 gyroscopic sight on the turret roof.

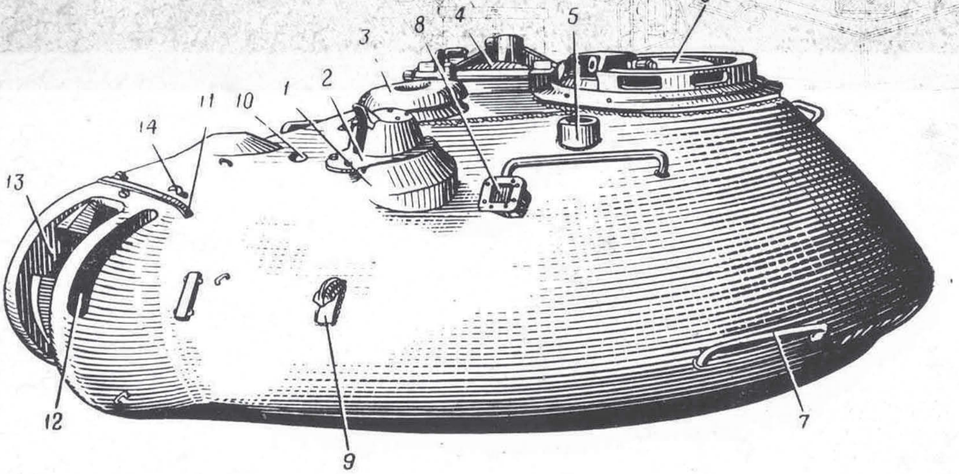


The T-10A as depicted in the Operator's Manual. The TPS-1 sight is barely visible.

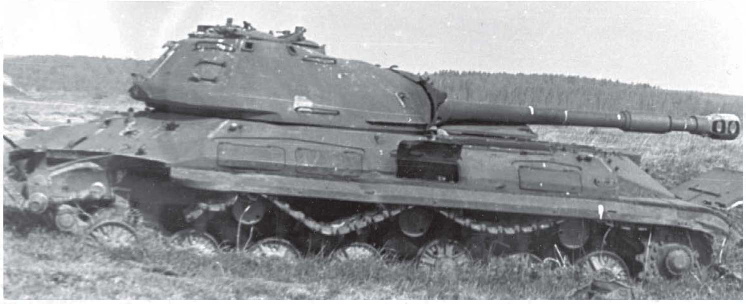
Tank Division based in Ukraine being among the first units to receive the tank. The T-10 made only a single appearance on Moscow's Red Square, when T-10B tanks passed before Soviet Premier Nikita Khrushchev and the Soviet political and military leadership on the tribunal above the Lenin Mausoleum during the 7 November 1957 military parade. The great majority of US and NATO military recognition manuals were for years based on photographs taken during this single event. Otherwise, the T-10 series served in relative obscurity far from the public gaze, with the only foreign based service being with the GSFG in Germany. Its only foreign 'expedition' was during the Soviet/Warsaw Pact invasion of Czechoslovakia in 1968. At that time the tank was being withdrawn from active divisions and placed in reserve depots, as it was no longer considered a viable first line tank, with only one regiment remaining in GSFG. From this perspective, the T-10 was a highly complex and expensive heavy tank that was never used in combat or for its intended purpose; nevertheless, the T-10 was a highly significant design in its own right and as the chassis for a series of other military vehicles.

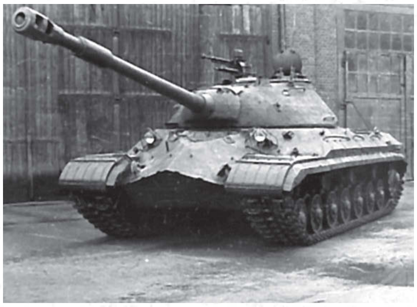
'COMBAT' DEBUT

The T-10 series never engaged in active combat during its Soviet Army service. By the time it was operationally deployed in Czechoslovakia, the two divisions in GSFG were being re-equipped with the newer T-62 tank and the T-10M tanks were in the process of being withdrawn. The sole remaining T-10M regiment, the 95th Heavy Tank Regiment from the former



The T-10A turret again as depicted in the Operator's Manual. The TPS-1 sight, the main defining feature of the T-10A, is evident in this illustration.

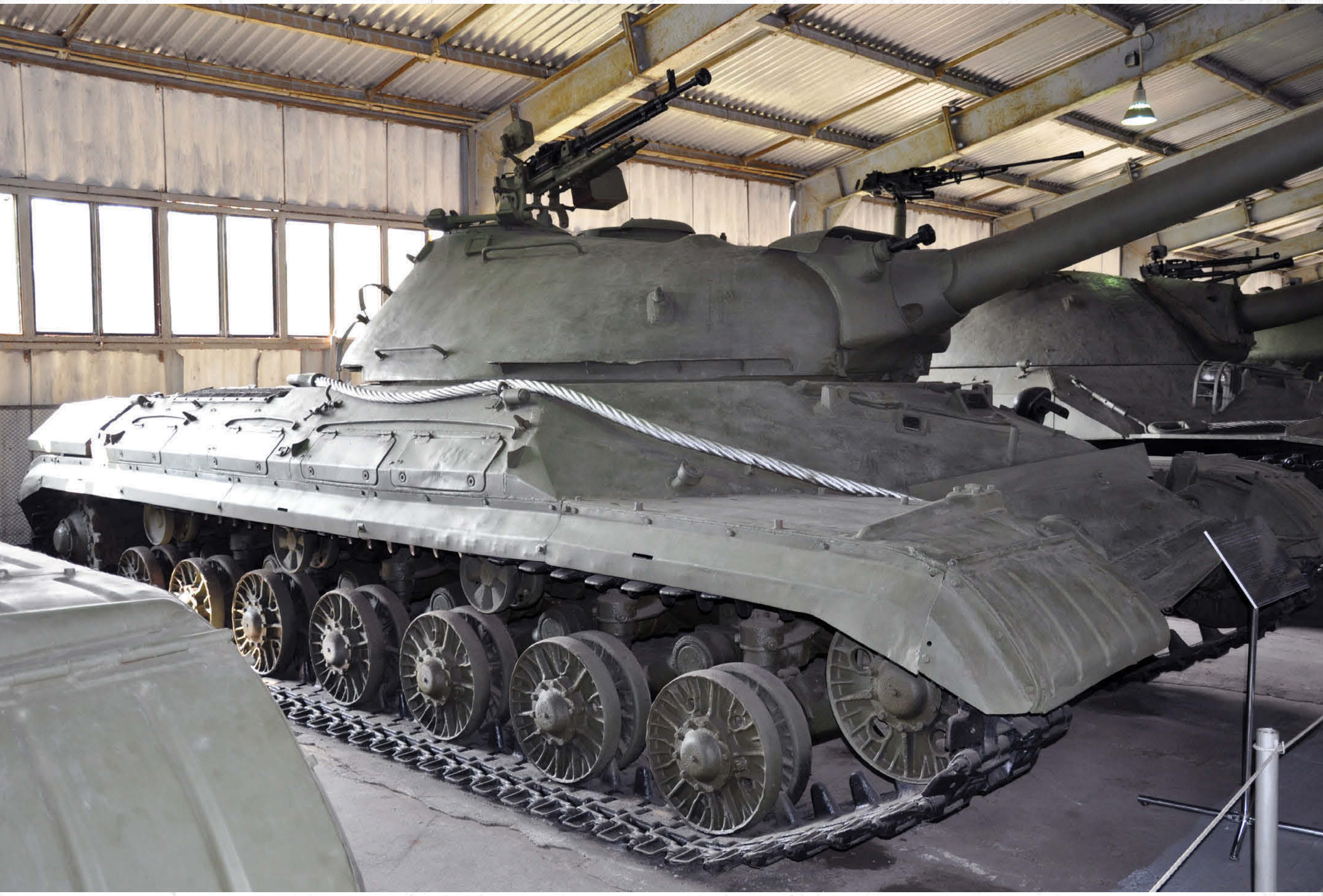




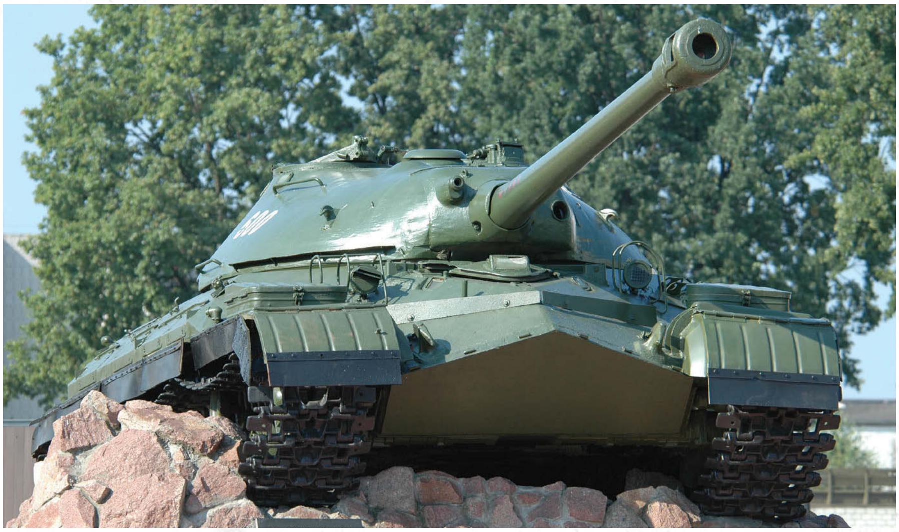
LEFT: After removal from service, this T-10A ended its career as a range target. There are variances in the periscope gun sight apertures between T-10A and B variants, and there would appear to have also been considerable variances in the build or later modification, so that a certain external appearance cannot be taken as definitively representing either the 'A' or 'B' variant.
FAR RIGHT: This T-10B has what was the proposed definitive mantlet aperture arrangement for the T-10B, but not the infrared (IR) driving lights.

13th Guards Heavy Tank Division (now re-designated the 9th Tank Division) of the 1st Guards Tank Army, participated in Operation *Dunay* (*Danube*) as part of the Soviet led Warsaw Pact contingent that invaded Czechoslovakia in August 1968, which would be the one and only operational deployment of the T-10 tank heavy tank series.

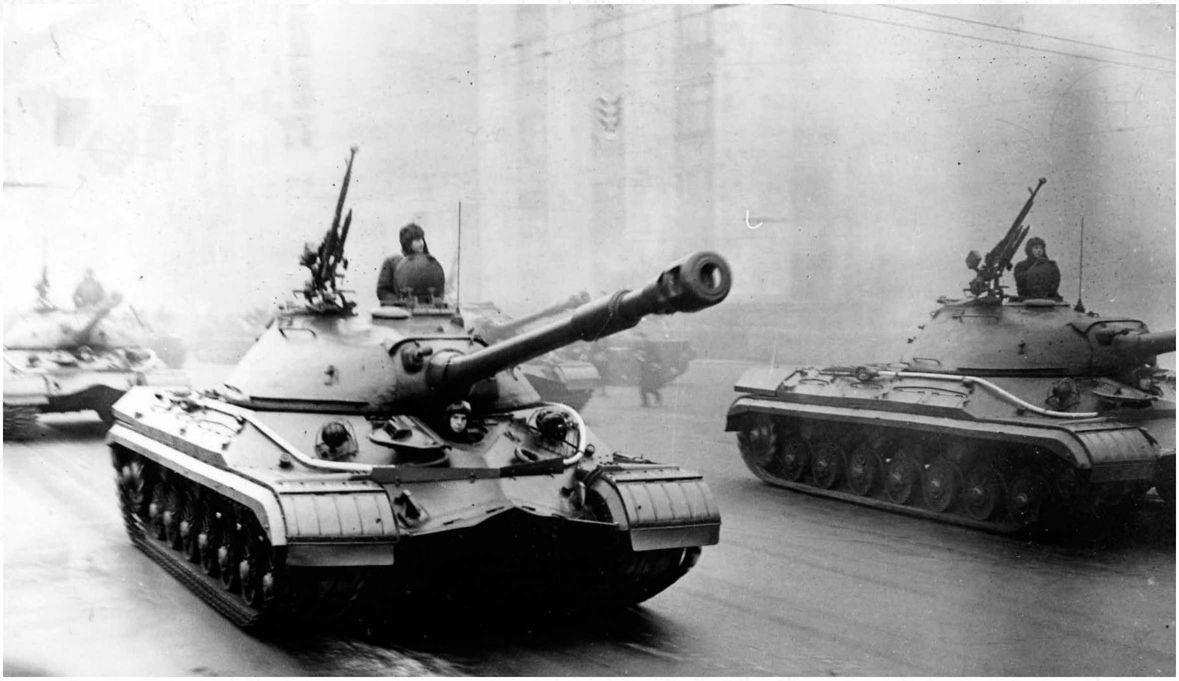
The Czechoslovakian government, under the leadership of Alexander Dubček, had proven more liberal and less obedient to the principles of the Warsaw Pact than was considered tolerable by the Kremlin. The Soviet Union already had bloody experience with East Germany in 1953 and Hungary in 1956, however, and did not want a prolonged engagement that might result in endless discussions not in the Soviet Union's best interests. The Soviet Premier Leonid Brezhnev accordingly authorized a Warsaw Pact



ABOVE: This T-10, located at the Kubinka Tank Museum, is a prototype for the T-10A and might actually be better described as such, though the museum defines it as a base model T-10.



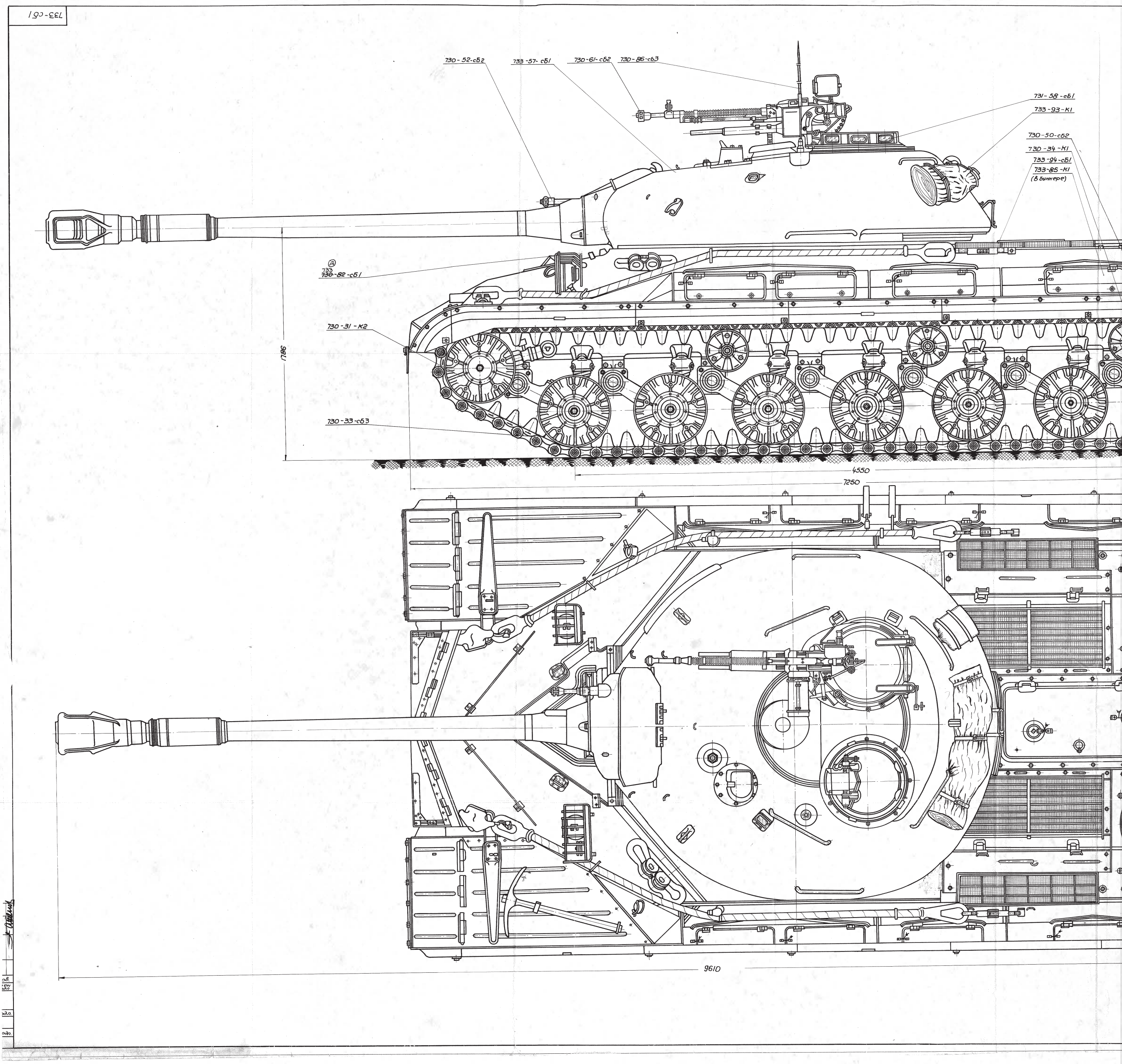
RIGHT: This T-10, located as a memorial on a Ukrainian military base, has T-10B upgrades, while retaining features of the initial T-10, including the clean gun barrel without bore evacuator.



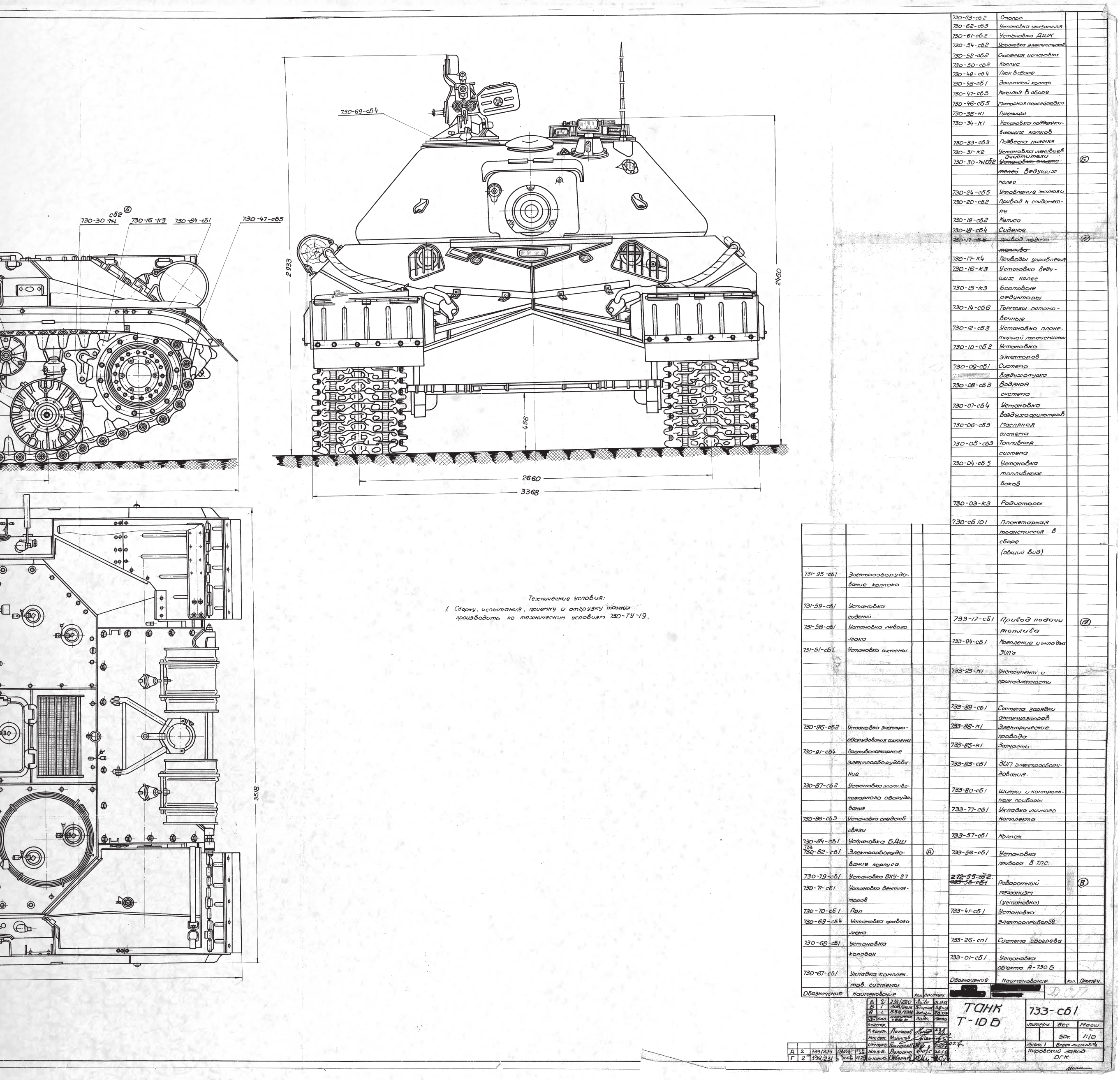
rather than pure Soviet intervention to restore the status quo, or 'constitutional order' as it was otherwise termed. The Soviet contingent assembled for the task consisted of three armies (eight divisions) from the Group of Soviet Forces (Germany), three divisions from the Southern Group of Forces (Hungary), one army with three divisions from the Baltic Military District, and a division from Northern Group of Forces (Poland), together with three Soviet armies and one corps with seven divisions from the Carpathian Military District, one Soviet army with two divisions from the Belarusian Military District, one Soviet army with one division from the Odessa Military District and two Soviet airborne divisions. The Soviet Group of Central Forces Czechoslovakia was stood down during the preparations so as not to alert the Czechoslovakian government. In order that the 'restoration of constitutional order' would not be perceived as a purely Soviet affair, the Soviet forces were joined by Warsaw Pact nations – Bulgaria (two regiments), Hungary (one division), East Germany (DDR) (two divisions) and Poland (one army with four divisions and an airborne division). Not all these units

TOP: The definitive 'early T-10' parade photograph used in Western military intelligence recognition manuals. The tank is often defined as a T-10A, as it has a bore evacuator, and as T-10B, as it has IR night vision equipment for the driver, but has no TPS-1 gyroscopic sight as fitted to the T-10A and T-10B as standard. Red Square, Moscow, 7 November 1957.

ABOVE LEFT: It is likely that these T-10B tanks were rebuilt from the early production T-10, mounting IR driving lights but without the standard T-10A/B sighting modifications.


733-сб1
730-52-сб2
733-57-сб1
730-61-сб2
730-86-сб3
731-58-сб1
733-93-К1
730-50-сб2
730-34-К1
733-94-сб1
733-85-К1
(в бункере)
Д
733
730-82-сб1
730-31-К2
730-33-сб3
1786
4550
7250
9610

The original plant drawings show the definitive features of the Obiekt-733. Note the use of IR night driving equipment that also sometimes defined the T-10B in Soviet sources even when the tanks had not been upgraded with the PUOT-2 twin-axis gun stabilization system. The engine deck access panels are also modified on the T-10B.



Технические условия:

1. Сборку, испытания, приемку и отгрузку танка производить по техническим условиям 730-ТУ-19.

Обозначение	Наименование	Кол.	Примеч.
731-95-сб1	Электрооборудование колпака		
731-59-сб1	Установка сидений		
731-58-сб1	Установка левого люка		
731-51-сб1	Установка системы.		
730-96-сб2	Установка электрооборудования системы		
730-91-сб4	Противопожарное электрооборудование		
730-87-сб2	Установка противопожарного оборудования		
730-86-сб3	Установка средств связи		
730-84-сб1	Установка БДШ		
733 730-82-сб1	Электрооборудование корпуса		Ⓐ
730-79-сб1	Установка ВКУ-27		
730-71-сб1	Установка вентиляторов		
730-70-сб1	Пол		
730-69-сб4	Установка правого люка.		
730-68-сб1	Установка коробок		
730-67-сб1	Укладка комплектов системы		

Обозначение	Наименование	Кол.	Примеч.
730-63-сб2	Стопор		
730-62-сб3	Установка указателя		
730-61-сб2	Установка ДШК		
730-54-сб2	Установка электроспусков		
730-52-сб2	Спаренная установка		
730-50-сб2	Корпус		
730-49-сб4	Люк в сборе		
730-48-сб1	Защитный колпак		
730-47-сб5	Крылья в сборе		
730-46-сб5	Моторная перегородка		
730-35-к1	Гусеницы		
730-34-к1	Установка поддерживающих катков		
730-33-сб3	Подвеска нижняя		
730-31-к2	Установка ленивцев		
730-30-~~к1~~сб2	очистители ~~Установка очистителей~~ Ведущих колес		Ⓑ
~~730-17-сб6~~	~~Привод подачи топлива~~		Ⓐ
730-24-сб5	Управление жалюзи		
730-20-сб2	Привод к спидометру		
730-19-сб2	Кулиса		
730-18-сб4	Сиденье		
730-17-к4	Приводы управления		
730-16-к3	Установка ведущих колес		
730-15-к3	Бортовые редукторы		
730-14-сб6	Тормозы остановочные		
730-12-сб3	Установка планетарной трансмиссии		
730-10-сб2	Установка эжекторов		
730-09-сб1	Система воздухопуска		
730-08-сб3	Водяная система		
730-07-сб4	Установка воздухофильтров		
730-06-сб5	Масляная система		
730-05-сб3	Топливная система		
730-04-сб5	Установка топливных баков		
730-03-к3	Радиаторы		
730-сб101	Планетарная трансмиссия в сборе (общий вид)		
733-17-сб1	Привод подачи топлива		Ⓐ
733-94-сб1	Крепление и укладка ЗИП'а		
733-93-к1	Инструмент и принадлежности		
733-89-сб1	Система зарядки аккумуляторов		
733-88-к1	Электрические провода		
733-85-к1	Запчасти		
733-83-сб1	ЗИП электрооборудования.		
733-80-сб1	Щитки и контрольные приборы		
733-77-сб1	Укладка личного комплекта		
733-57-сб1	Колпак		
733-56-сб1	Установка прибора в Т.П.С.		
272-55-сб2. ~~733-55-сб1~~	Поворотный механизм (установка)		Ⓑ
733-41-сб1	Установка электроприборов		
733-26-сп1	Система обогрева		
733-01-сб1	Установка объекта А-730 Б		

Лит. изм.	Кол.	Документ №	Подп.	Дата
Д	2	339/225		27.2.58
Г	2	339/231		19.2.5
В	2	338/220		18.12.58
Б	1	308/2613		28.11.5
А	1	358/134		28.7.5

Констр.		
В. констр.	Леканов	23.5.57
Нач. сек.	Манилов	
Инспекц.	Григорьев	
Нач. к. Б.	Волошин	26.5.5
Гл. констр.	Сварцов	

[redacted] [redacted] ДСП

ТАНК
Т-10 Б

733-сб1

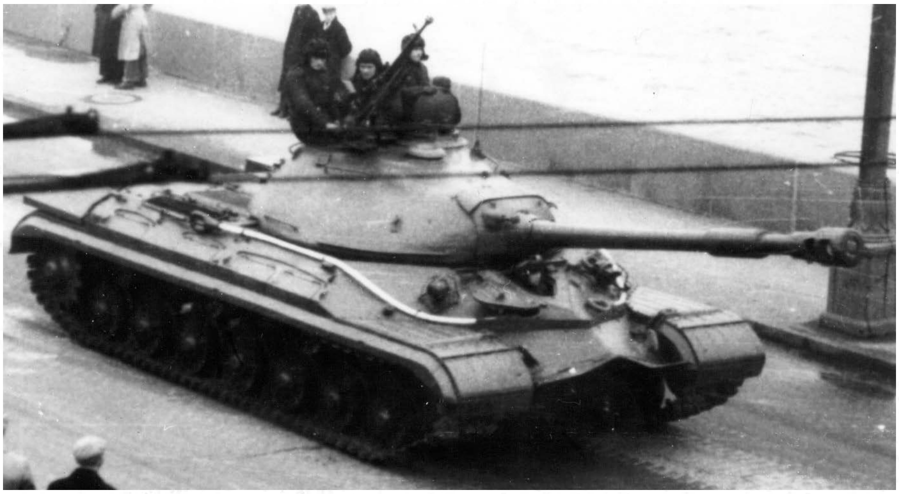
Литера	Вес	Масш.
	50т.	1:10

Лист: 1 Всего листов: 1

Кировский завод
ОГК

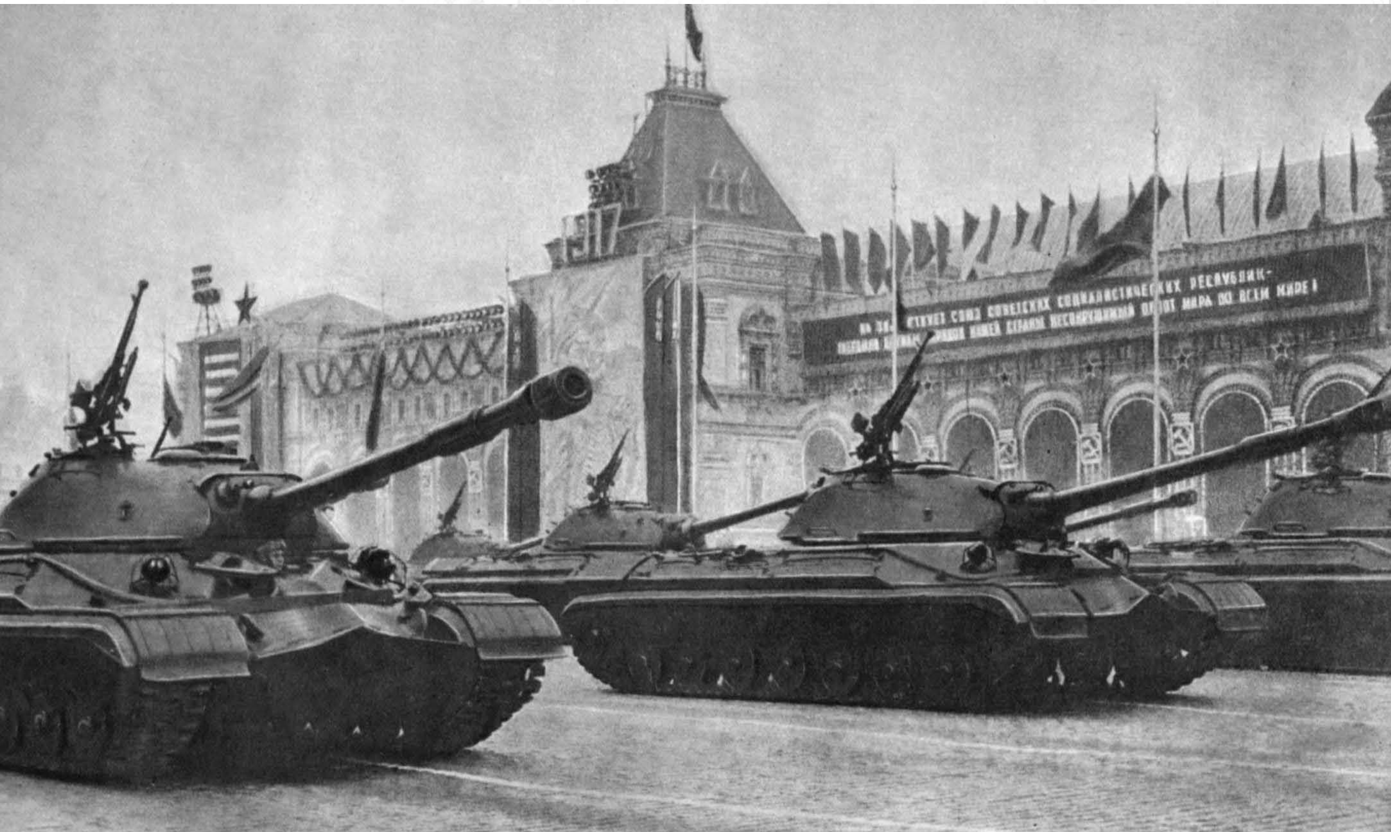
were at full strength, but for the task at hand the combined operation was more than sufficient using the sledgehammer and walnut principle.

At 23:00 on the night of 20 August 1968, the combined Soviet and Warsaw Pact force, consisting of some 200,000 troops supported by 2,000 tanks, began the invasion of Czechoslovakia, and by daylight Soviet and Warsaw Pact armoured forces were deep inside the country. The advance on Prague was primarily carried out by Soviet and Polish VDV (airborne) units, while the T-10M equipped tank units were mainly located in and around



RIGHT: Another famous 'spy' photograph, showing one of the parade tanks moving along the Moscow river embankment, the Naberezhne, after the 7 November 1957 Red Square parade. This photograph was also for many years a stock image in NATO recognition manuals.

BOTTOM: A typical Soviet in-period retouched photograph of the same T-10B tanks during the T-10 series' sole public appearance on Red Square on 7 November 1957.



Plzen (Pilsen). The Soviet 95th Heavy Tank regiment marched to the city of Plzen, where it provided security for the headquarters and staff of the 1st Guards Tank Army tasked with holding all of Western Czechoslovakia. The 9th Tank Division accompanied the 1st Guards Tank Army headquarters units, moving on and then being based in Plzen. To cover the required road range, the tanks were fitted with not only the twin 200 litre auxiliary fuel tanks now mounted on the T-10M as standard, but also two additional 200 litre barrels to provide sufficient range.

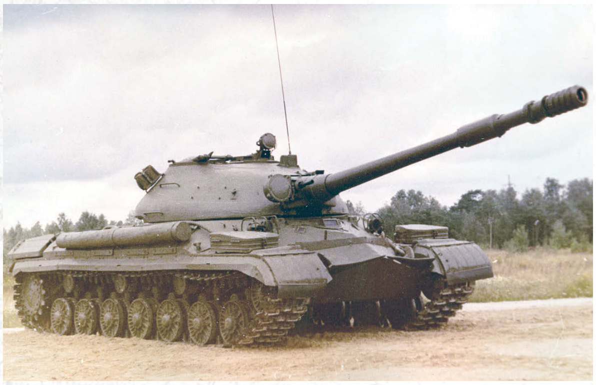
For Operation *Dunay* the tanks were given a combination of markings to identify them and to exclude confusion with Czech vehicles. A large white cross was hand applied over the hulls and turrets of Warsaw Pact tanks and other AFVs, with the cross meeting in the centre of the tank turrets. Since the tanks were part of a tank regiment, they were given a diamond insignia on the sides of the turret front (other units used either diamonds for tank regiments or squares for tank battalions of motorized rifle regiments). These had numbers in them that were based on movement control codes for the units. While no definitive explanations have ever been found, they cover a movement serial element, number of vehicles in that serial and the individual vehicle number. For example, 32 over 25 represented 32 tanks in this segment, of which the tank concerned would have been number 25.

As regards tank engagements involving the T-10M, there are no recorded incidents of T-10 tanks being involved in any skirmishes or direct engagements against Czech military or paramilitary forces during the operation. The few grainy photographs of the time that were taken show T-10Ms on the march or on the streets of Plzen, but without the destruction of tanks by Molotov cocktails that had been prevalent in Hungary in 1956.

Most tanks including the T-10Ms around Plzen were withdrawn from Czechoslovakia from 1 November, with the T-10M tanks returning to their GSFG garrisons in East Germany.

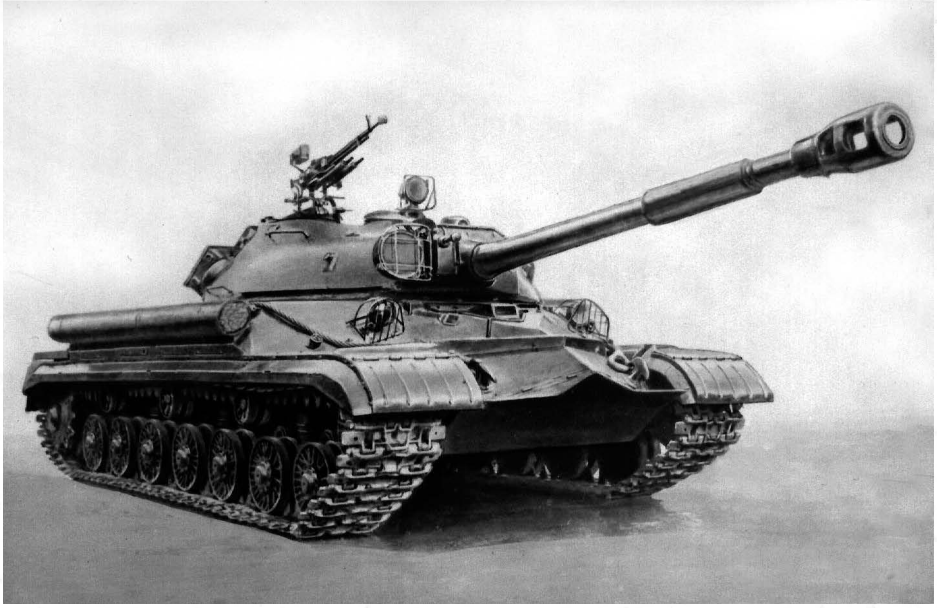
BOTTOM LEFT: This is the only colour photograph of the entire T-10 series that has to date become available. Note the wooden unditching beam, the non-standard turret stowage and the splash deflector that gave Western intelligence analysts such a hard time when viewing grainy initial views of the new tank.

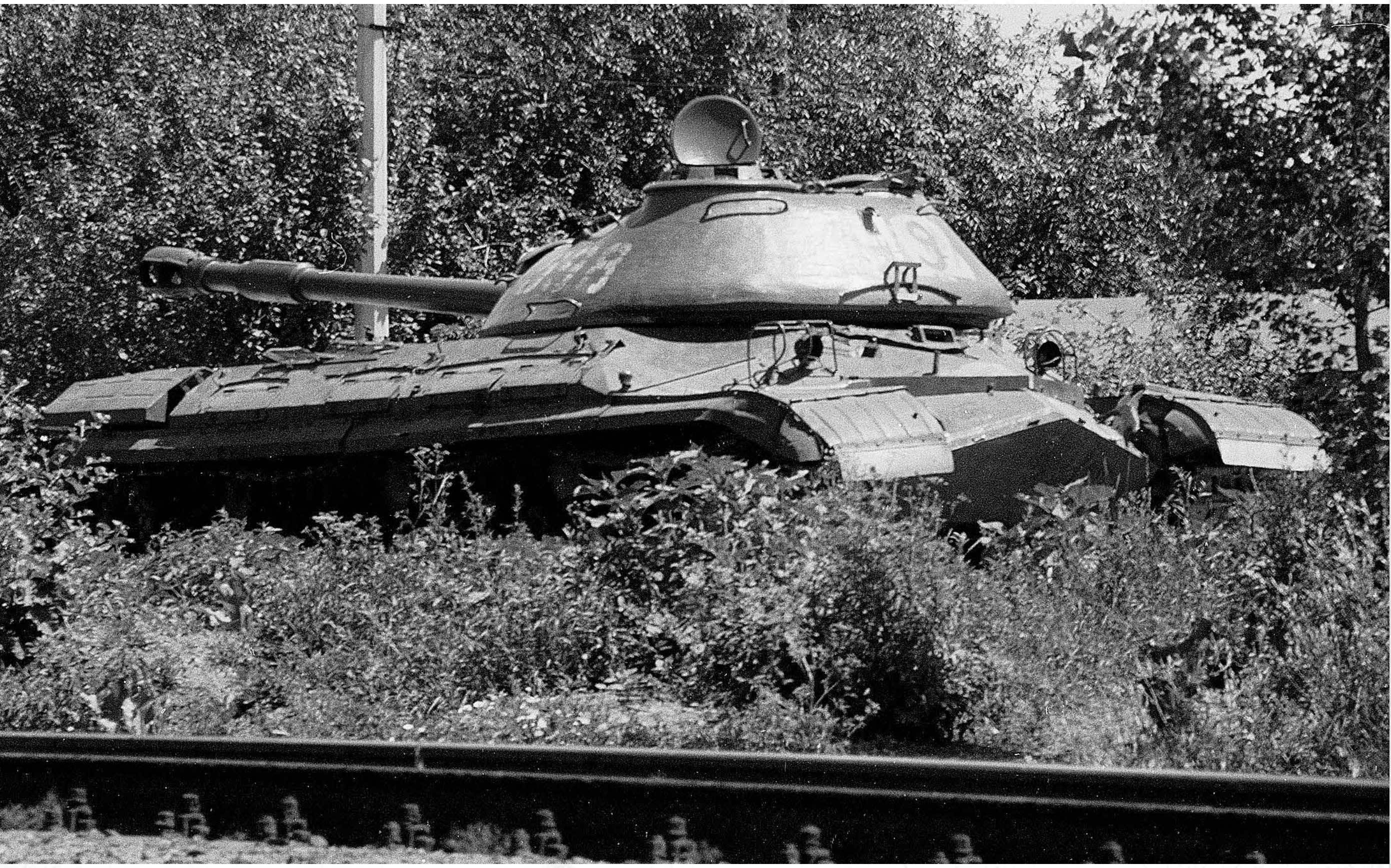
BOTTOM RIGHT: This T-10B was used as a memorial for some years before being recovered to Kubinka where it sat in the famous 'back yard' for several years. Its ultimate fate is unknown.

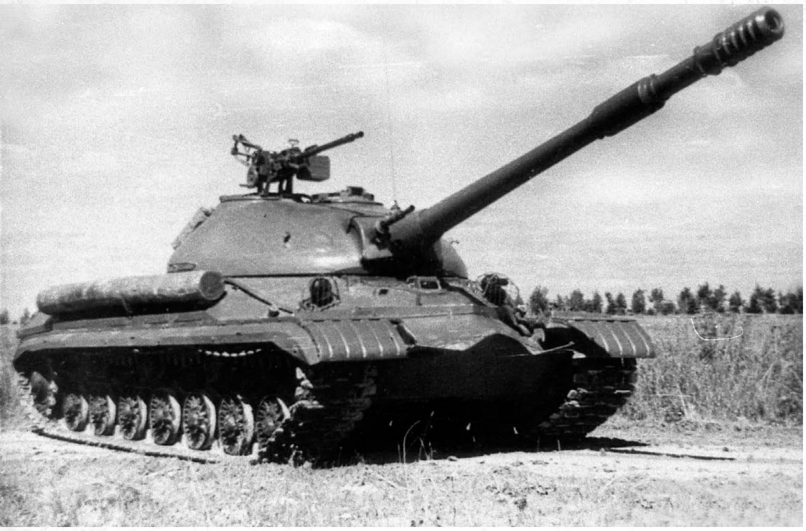


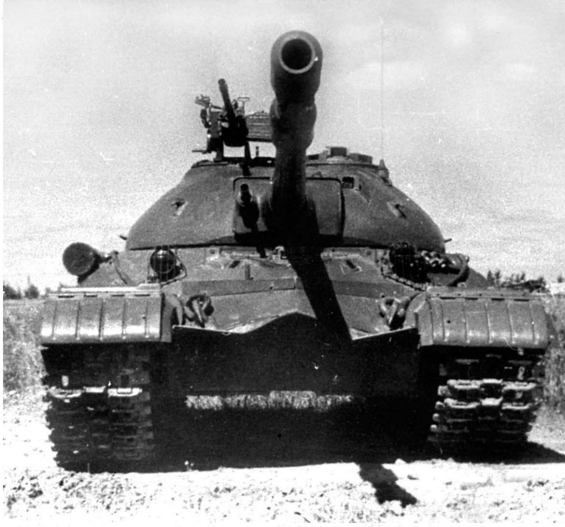
RIGHT: A retouched contemporary Soviet photograph of the T-10B fitted with the TPS-1 gyroscopic sight carried over from the T-10A and a full set of IR night fighting equipment, as standardized on the T-10M.

BOTTOM: This T-10B was one of many scrapped at the very end of the 1980s. It awaits further transport to its ultimate destruction. Bucha Railway Station, Ukraine, 1989.





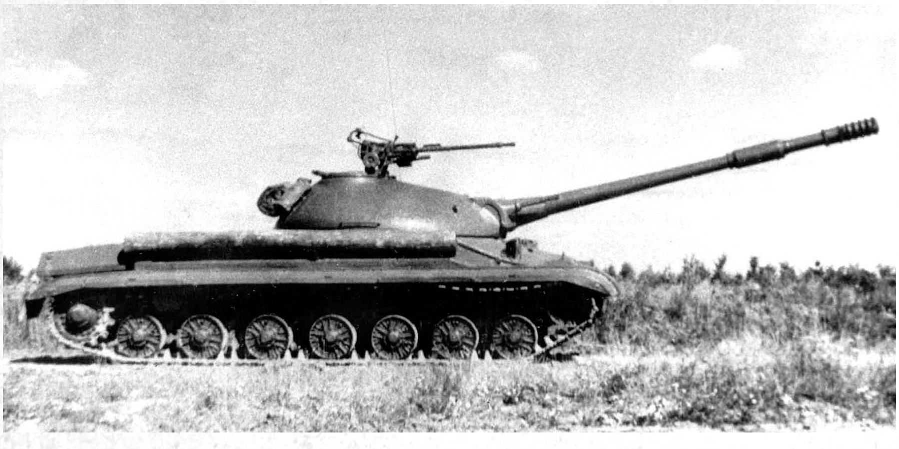




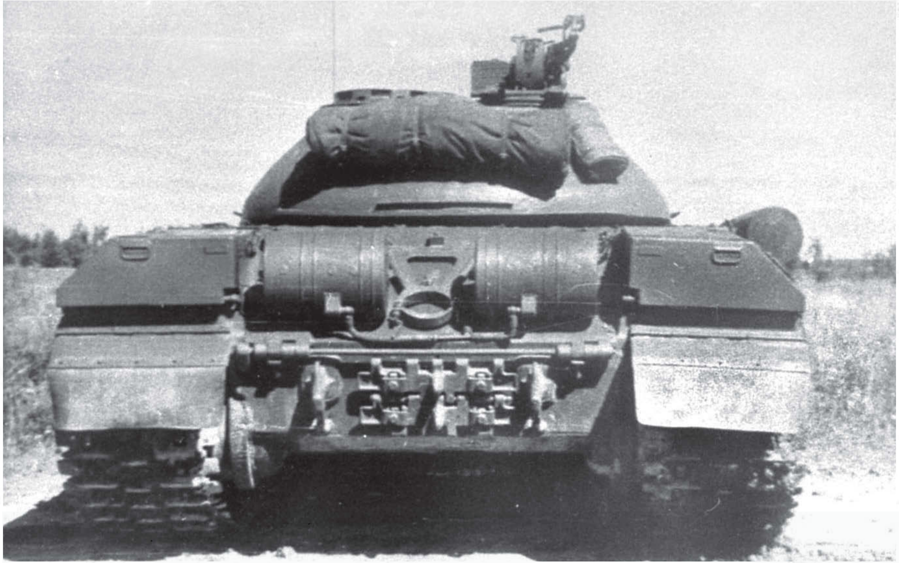
EARLY RETIREMENT

ABOVE LEFT AND RIGHT: T-10M (Obiekt-734) during evaluation trials, with the turret mounted KPVT AAMG installed. The splash deflector on the glacis gives the tank a highly distinctive 'duck bill' appearance.

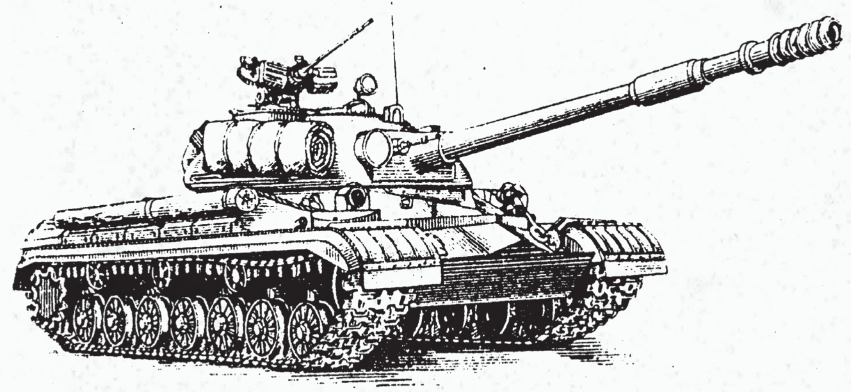
Soviet Premier Nikita Khrushchev played a personal role in the demise of the T-10 heavy tank. The former collective farm manager was a missile enthusiast, and this extended to tank armament in addition to strategic weapons. In fact, Khrushchev was against gun tanks in principle and heavy tanks in particular, and his views on this subject were widely known. The early 1960s were a critical time in the Cold War, and in 1962 – soon after the near catastrophic Cuban Missile Crisis – Premier Khrushchev ordered an end to heavy tank production and future heavy tank development, which at the time was taken as a precursor to the possible cancellation of all conventional gun tanks in favour of missile armed designs. This development was clearly



In side profile, the T-10M (in this case an Obiekt-734) is easily distinguished by its multi-baffle muzzle brake and bore evacuator arrangement. This prototype tank lacks the production T-10M's standard sighting arrangements.

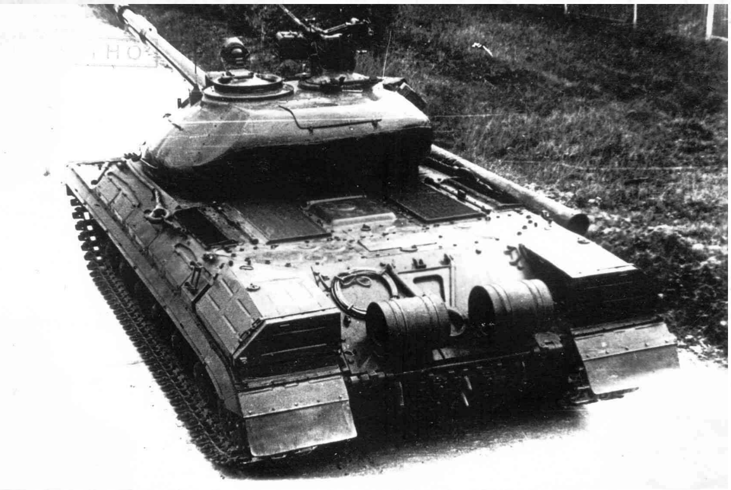


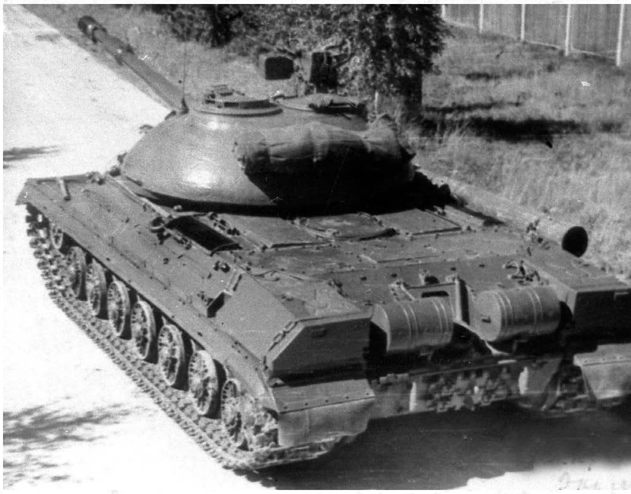
The T-10M in standard configuration with the angular external fuel tanks and BDSh smoke canisters, which were replaced by additional fuel tanks for long marches, such as into Czechoslovakia.



The T-10M as depicted in the Operator's Manual.

not good news either for the ChKZ and LKZ tank plants, or for Iosef Kotin, who was not enthusiastic about the premier's decisions. He continued to have the tanks built as well as developing new tank designs with missile armament in an attempt to ensure the prolongation of the T-10 base chassis. Ultimately Khrushchev lost patience and warned Kotin to cease his heavy tank activities if he wished to retain his position. The LKZ plant in Leningrad ceased series production of heavy tanks in early 1963, though it continued to build a number of prototypes before returning to tank production many years later with the introduction of the T-80 Main Battle Tank. Production continued on a somewhat *ad hoc* basis at ChKZ in Chelyabinsk until the end of 1965, at which point T-10M production finally ceased. Although the T-10 series was retained in service for many years thereafter, it was maintained

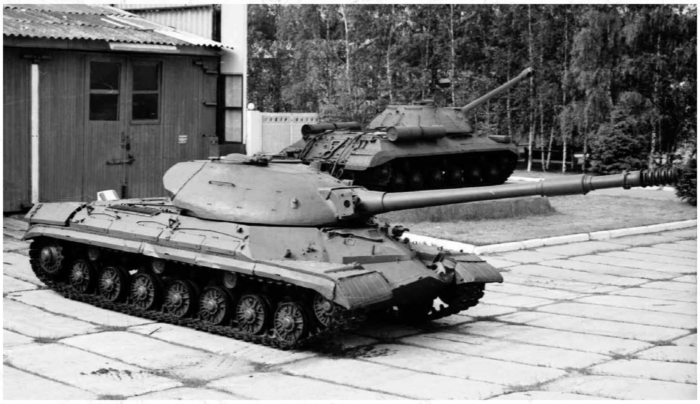




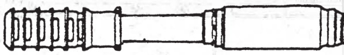
ABOVE LEFT: A very rare photograph taken at the ChTZ plant in Chelyabinsk showing the sheet steel turret bustle fitted to some T-10M tanks, which was used to stow the tarpaulin and crew personnel effects. Note the hatch in the container roof.
ABOVE RIGHT: A T-10M (Obiekt-734) at the ChTZ plant in Chelyabinsk. Note the standard turret rear stowage arrangement for the tarpaulin.
BELOW: A T-10M with steel turret bustle during evaluation trials.

in long-term strategic storage rather than in active service. Some T-10 tanks were also latterly withdrawn from service and used as range targets.

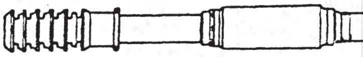
Ultimately, the T-10 series of tanks was withdrawn from service because technological developments, both domestically and abroad, led to the T-10 series losing the superiority on the battlefield that it had enjoyed when initially introduced. The development by NATO of APDS and HEAT ammunition, and the introduction both by the Soviet Union and NATO countries of similarly capable anti-tank missiles that could penetrate the conventional armour protection of heavy tanks as easily as medium and MBT types at all normal combat ranges of 3,000m or less, ended the dominant position of the heavy tank on the battlefield, not just in the Soviet Union, but worldwide. With the widespread introduction of anti-tank missiles mounted on relatively light vehicle chassis, heavy tanks such as the Soviet T-10, with their slow rate of fire of only three to four rounds per minute, were also now at an extreme disadvantage. This was particularly true

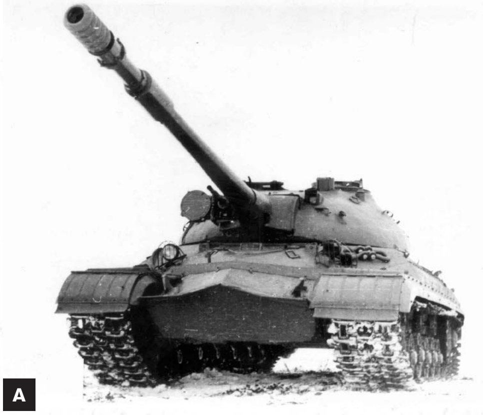


The T-10M is significantly different in appearance (and overall size) compared to its predecessor, the IS-3. This photograph of the T-10M now preserved at Kubinka with an IS-3M in the background makes for a good comparison. This T-10M with its distinctive steel turret bustle may well be that shown in the period trials photographs.

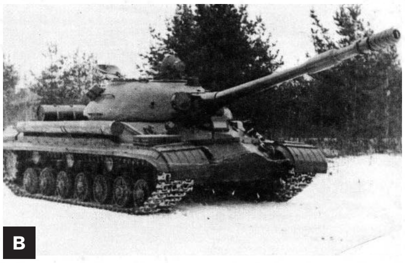


A A T-10M (Obiekt-734) during winter trials. This tank has a full array of sights fitted to the turret. Compare this with some other T-10M ‘standard’ configurations during evaluation trials.
B A T-10M during winter evaluation trials, fitted with additional long range fuel tanks and with other modifications.
C A T-10M during winter evaluation trials, presumably at the Kubinka polygon.

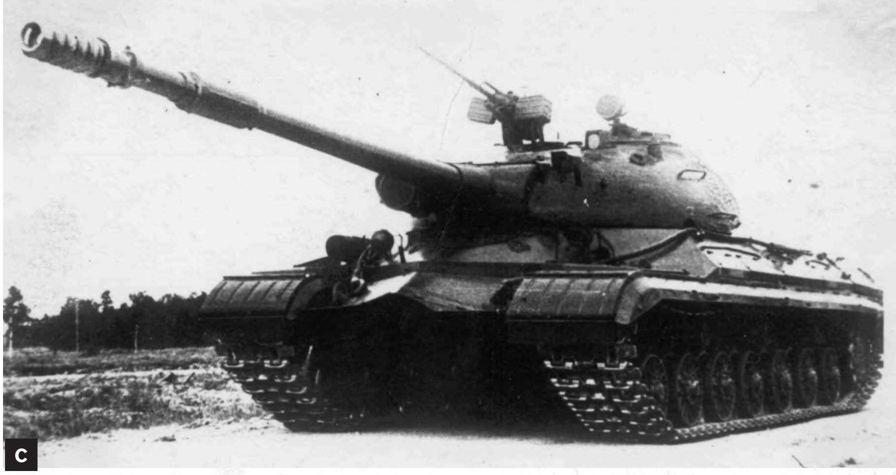




A



B



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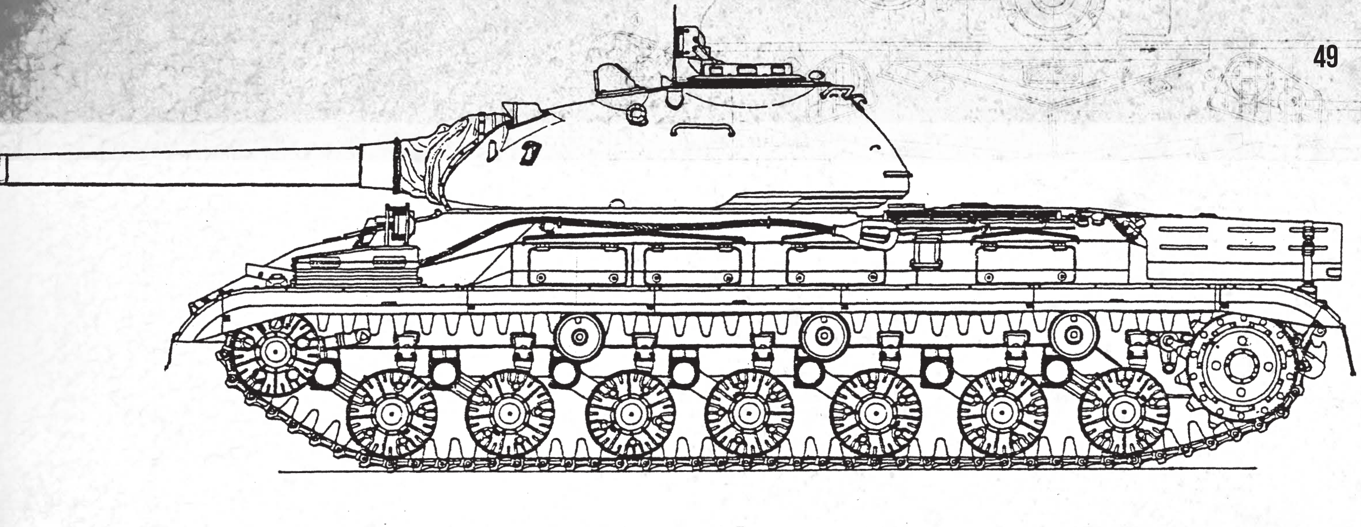
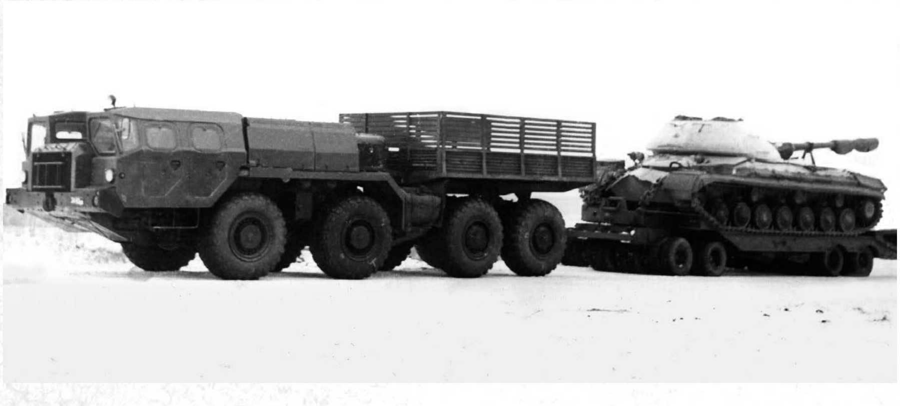


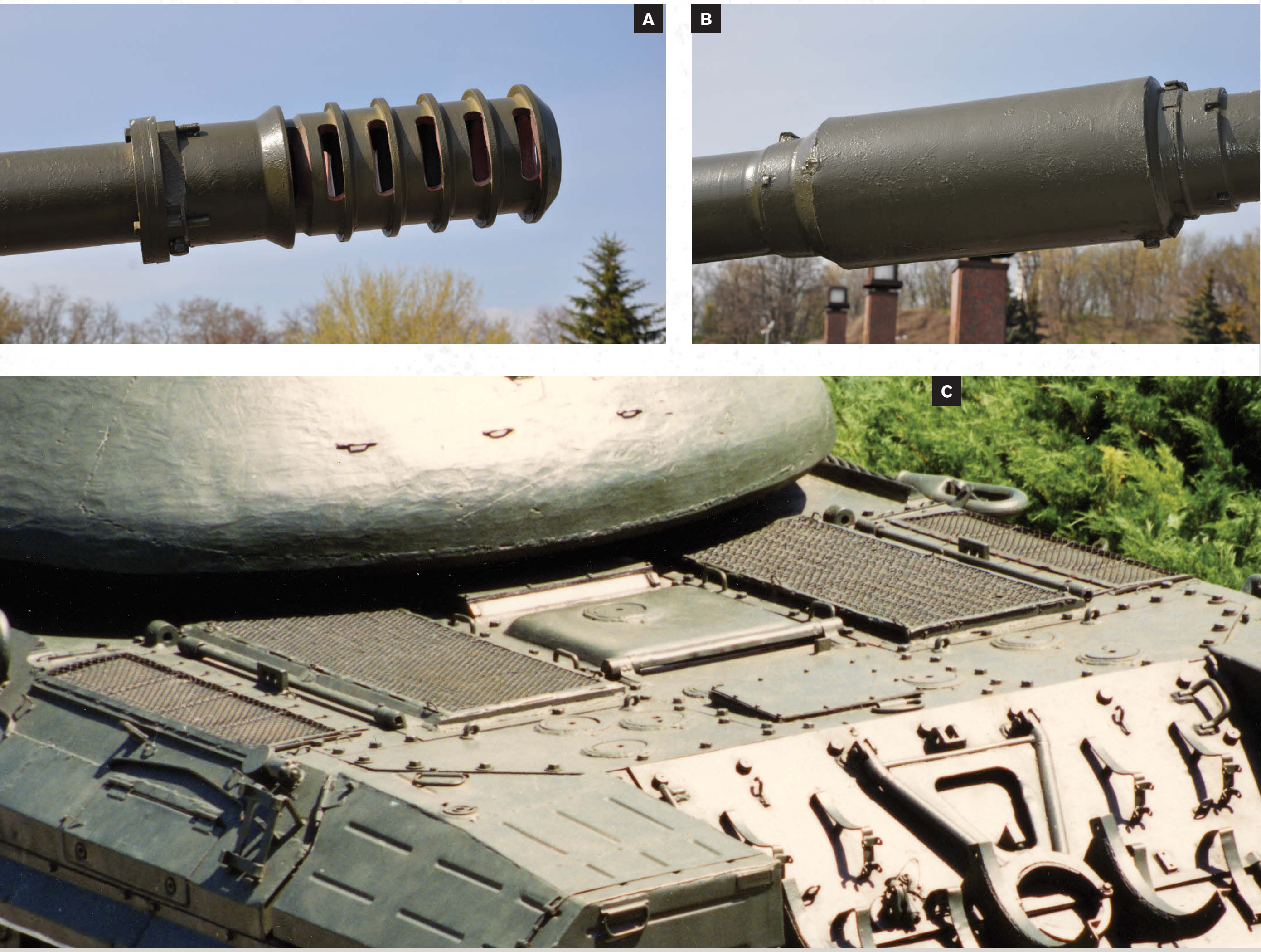
ABOVE: This side elevation and plan of the T-10M in standard configuration clearly shows the modified turret sighting arrangements specific to the later T-10M.



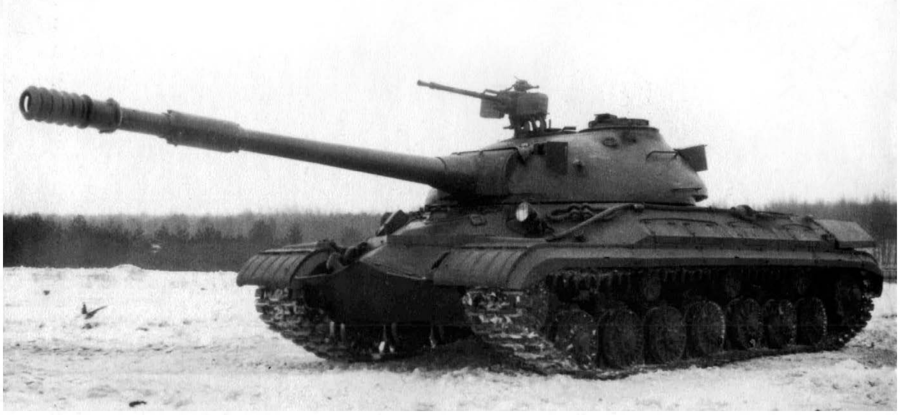
LEFT: In service, the T-10M was rarely seen, and then generally while being transported by rail. This T-10M with its gun partially covered is being towed by an equally rare MAZ-7410 configured as a ballast tractor truck.

in close range tank-to-tank combat at ranges under 750m, which was the norm for potential conflict in the undulating and wooded terrain of Europe for which the T-10 was designed.

Officially the T-10 series remained in the Soviet Army inventory until 1993, two years after the break-up of the Soviet Union, at which time a large number of T-10s were concentrated in the Russian Federation, Ukraine and Belarus. The majority of T-10s were subsequently scrapped; some were made into gate guardians at military bases and a few ended up in museums. The bell finally tolled for the T-10 series on 23 September 1997 when an order



(A) The main distinguishing feature of the T-10M is the combined multiple baffle muzzle brake and **(B)** bore evacuator arrangement, which are both far from simple devices. **(C)** The T-10M engine deck was also revised slightly from the earlier T-10, specifically the access hatches.



An LKZ built T-10M (Obiekt-272) during winter trials. Compare the turret sighting arrangements with the ChKZ built T-10M (Obiekt-734), and the differences between the two plants producing a single and supposedly unified T-10M tank type become apparent.

While in service, glimpses of the T-10M were until 1968 restricted to parade appearances by T-10M tanks belonging to the GSFG in East Germany, such as the tanks seen here with Soviet Guards Tank Army markings on parade in East Berlin.

signed by Russian President Boris Yeltsin ordered the now Russian Ministry of Defence to remove the obsolescent T-10 tanks from service and scrap them. Whichever date may be considered as the 'final' end for the T-10 series, the tank retains its unique historical status in being not only the last Soviet heavy tank to serve in the Soviet Army, but also the only Soviet heavy tank design to outlive the Soviet Union that had created it.

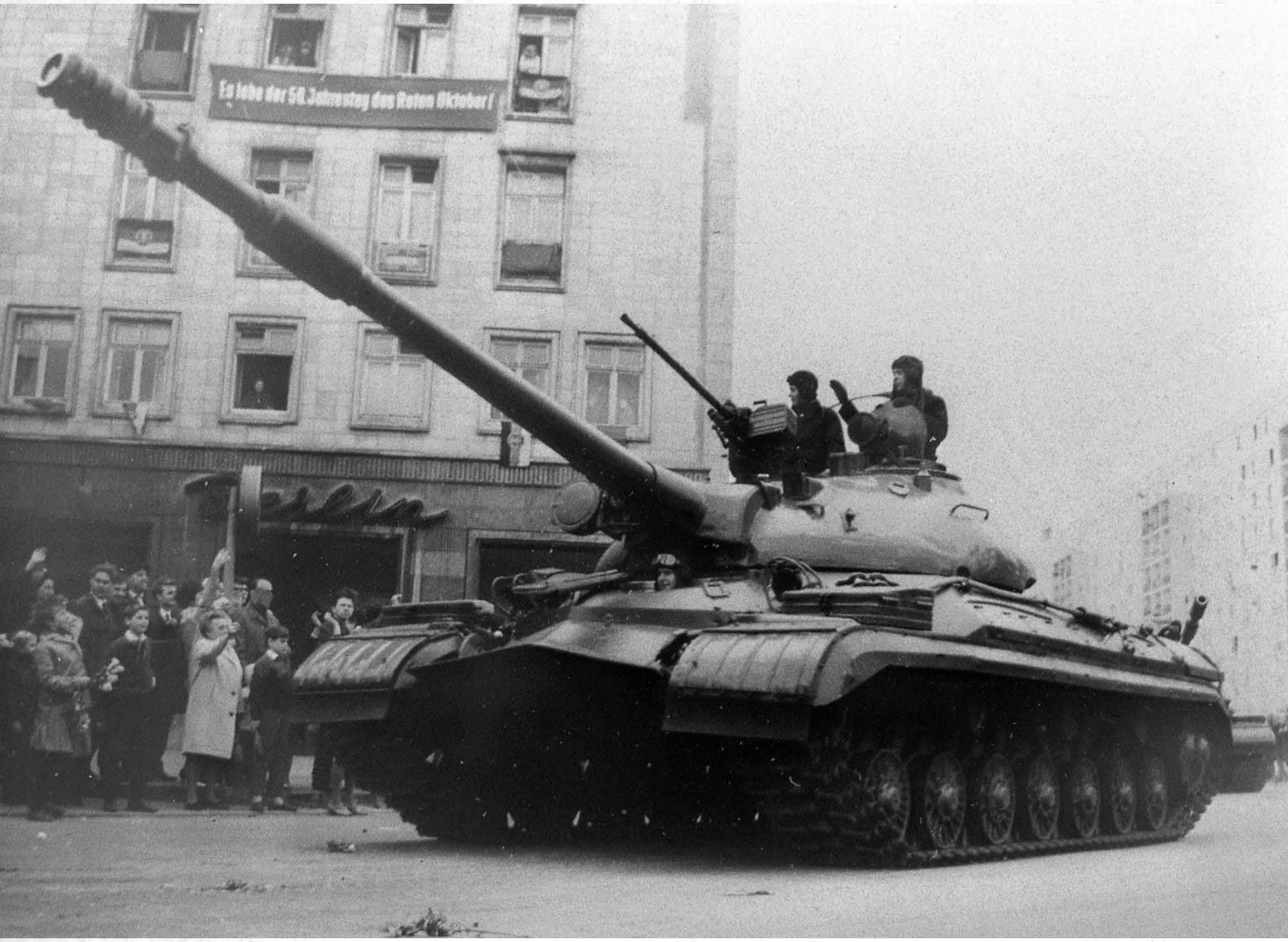
The role of the T-10 in the history of Soviet tank design was, however, far more than that of being the last Soviet series production heavy tank. Knowledge gained in the development of the T-10 was used in the development of other Soviet heavy tank prototypes, including the Obiekt-277 (LKZ), the bizarre looking but effective Obiekt-279 (VNII-100), and the steroidal T-10 alternative, the Obiekt-770 (ChTZ). The T-10 chassis and mechanical components were also used in the development of a whole range of specialized military vehicles, some of which remained as prototypes, with others entering limited series production.

Another grainy photograph of Soviet tanks in GSFG service on parade in East Germany. These appearances were until 1968 about the only glimpses Western intelligence experts got of the T-10M, which was never once paraded on Moscow's Red Square.

Senior Soviet Army officers during a demonstration of track repair. Note the disengaged track, loosened track guard and splash defector.

WESTERN RESPONSES

The British Conqueror (1954) and US M103 (1956) were developed in direct response to the surprise appearance of the Soviet IS-3 heavy tank at the Allied Victory Parade held in Berlin on 7 September 1945, and were the immediate NATO counterparts to the T-10. The NATO tanks were larger, heavier and more heavily armoured than the Soviet T-10, but they were also slower and less manoeuvrable, had less than half the road range, and further had no Nuclear, Biological, Chemical (NBC) warfare protection system or deep wading capability. The T-10M also had the advantage as regards night fighting capability.



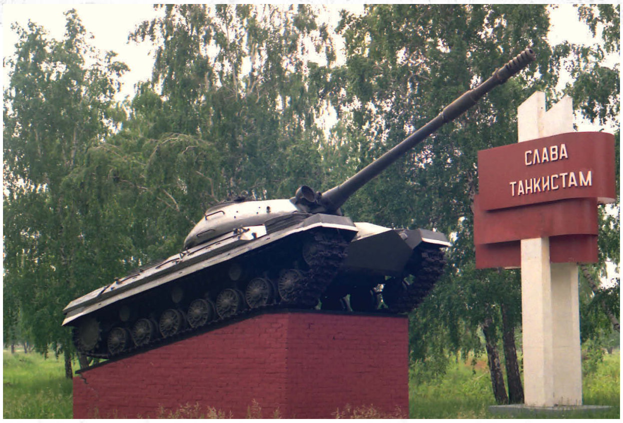
A Soviet GSFG T-10M, again photographed during an ‘October Revolution’ parade in East Germany.

The Conqueror did have vertical gun stabilization, but the M103 did not. Both NATO tanks had better armour, particularly on the glacis, but the T-10 series was a more manoeuvrable and agile tank in heavy tank terms. The death of the heavy tank was not confined to the Soviet Union, with both the Conqueror and the M103 leaving service at the same time that T-10M production ceased in the Soviet Union.

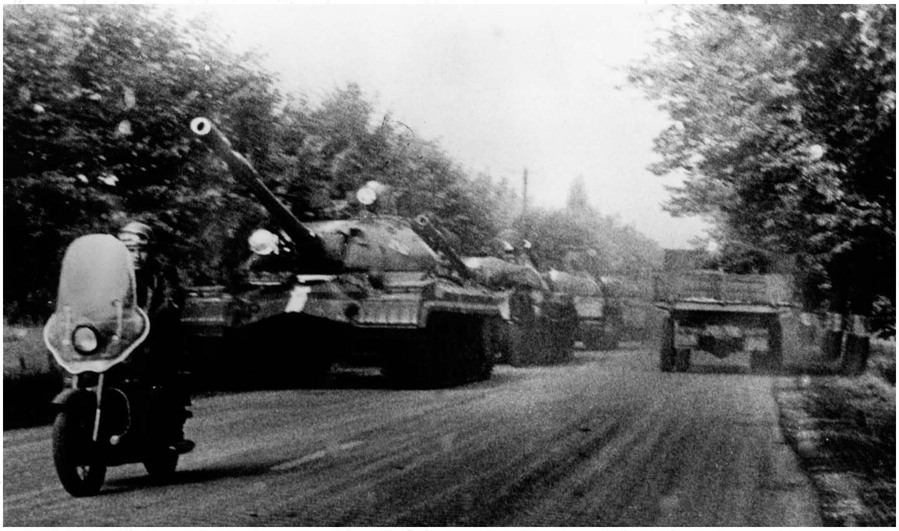
ASSESSMENT WITH HINDSIGHT

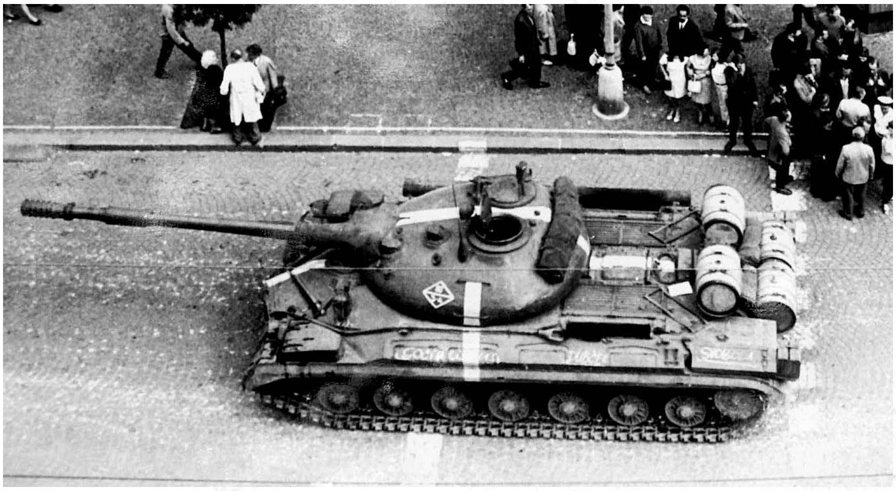
The T-10 heavy tank series is as enigmatic now as when it was first observed during the 7 November 1957 Red Square military parade, or during its

T-10Ms were stationed in East Germany, and in Belarus and Ukraine within the Soviet Union. Many remained on the Russian 'mainland', however. This T-10M is at the entrance to the Tank Officers School near Omsk.



The first and only operational deployment of the T-10M (and the T-10 as a series) was during Operation *Dunay*, the invasion of Czechoslovakia in 1968. These tanks of the 9th Heavy Tank Division are moving towards the city of Plzen. Note the tactical markings used on all AFVs involved in the operation. (Tank Museum)





A nice overhead view of a T-10M tank deployed in Plzen, showing clearly the tactical white cross markings and also the vastly additional fuel drum arrangements required for the deployment.

LEFT: The T-10Ms that were deployed in Plzen ended up with a mix of tactical markings and graffiti. Note the slogans and the red star with a swastika within painted on the track guard. The crowds appear relatively nonchalant, suggesting this photograph was taken once 'order was restored'.

TOP LEFT AND RIGHT: The arrival of Soviet and Warsaw Pact tanks in Czechoslovakia was unexpected, and there are few good quality photographs of the tanks involved in the operation. On those few that exist, the use of additional fuel drums supplemented by jerry cans shows the focus on fuel and range, almost reminiscent of the German situation in the Ardennes towards the end of World War II.

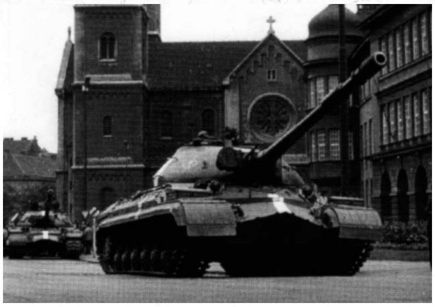
cameo appearance during the 1968 invasion of Czechoslovakia. With the exception of its sojourn in Czechoslovakia, the T-10 never entered combat as such, and unlike the IS-3, which was exported to the Middle East after Soviet service, the T-10 had no such international recognition. Consequently, NATO and the West never had the opportunity to evaluate the performance of the tank in foreign service, nor to purloin an example for close inspection, while its use by Soviet tank forces was for the most part obscured from general view.

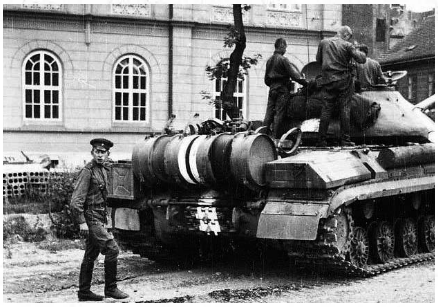
The tank caused major consternation for NATO intelligence sources, as no one had any idea of the actual capabilities of the tank, or even a good estimate of how many T-10s were built. Based on one assessment derived from an intelligence report of 120 tanks being built per month, Western military analysts erroneously determined production rates of around 1,500 a year, with more than 8,000 thereby built between 1958 and 1964 according to American CIA and DIA estimates. It was only long after the tank had left service that the actual number built was understood to be fewer than 1,600 tanks of all production models, and that most T-10 series tanks had spent their entire lives in strategic storage rather than active or even rotational (from storage) service. In Western intelligence circles, the tank had

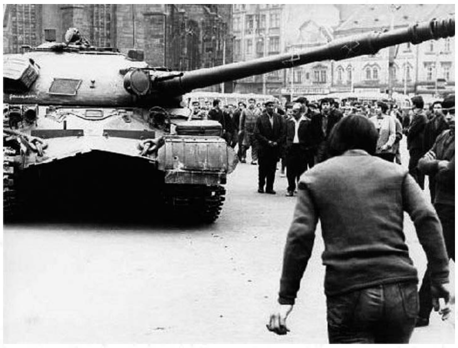
FAR LEFT: Another T-10M with the 'standard' additional fuel reserves carried on T-10Ms during Operation *Dunay* in 1968.

LEFT: Another grainy photograph taken in Plzen, showing clearly the 'invasion cross' markings.

MIDDLE LEFT: This T-10M parked in Plzen has lost its right track guard and splash deflector, with the ZIP box mounted on the turret for the duration.





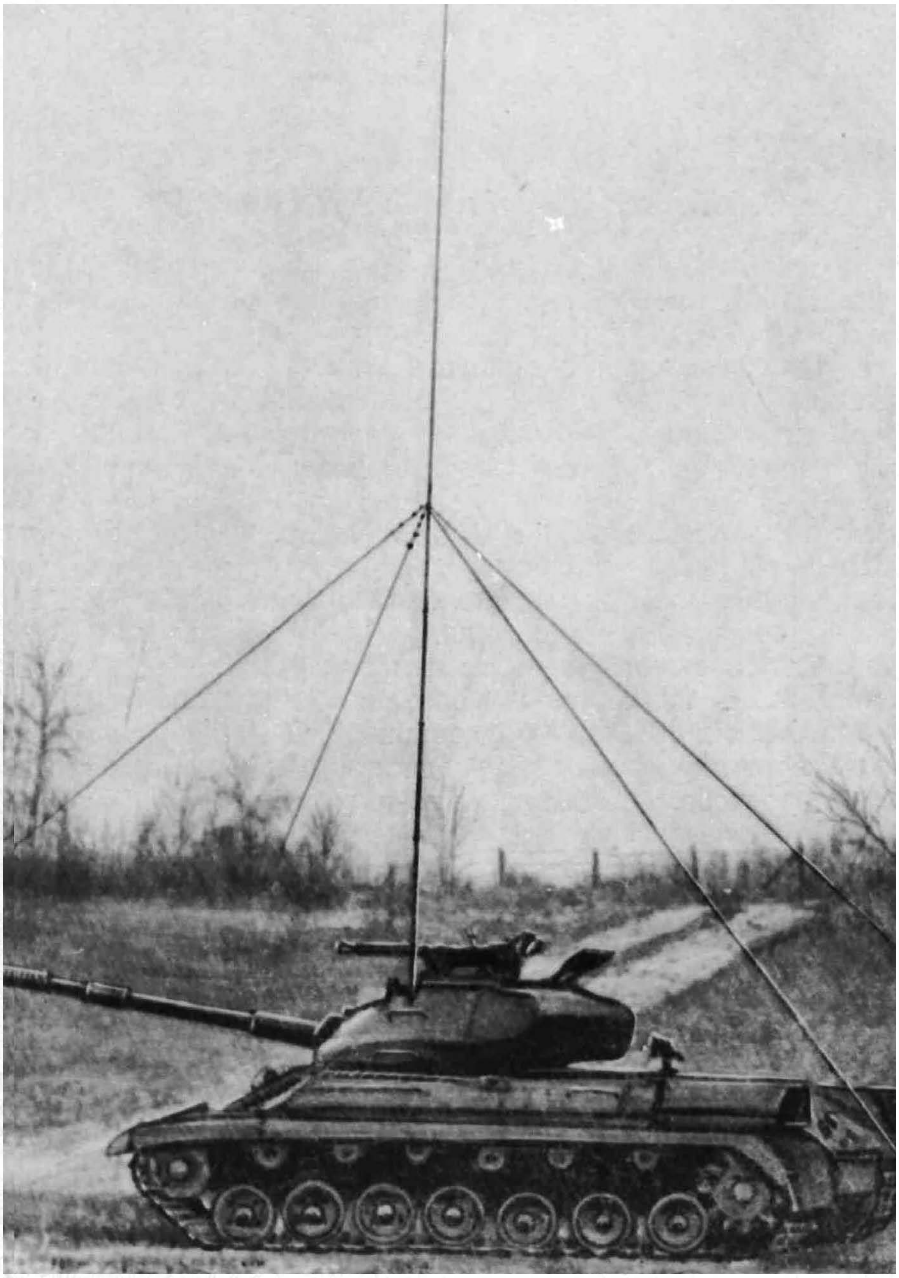


nevertheless served its purpose as part of the Soviet 'threat' analysis, which was directly linked to defence spending.

The T-10 series was the last series production heavy tank created by the Soviet Union, the ultimate refinement of the IS heavy tank series of 'breakthrough' tanks. Though powerful and a forbidding weapon in the minds of Western Intelligence specialists, the tank was somewhat of a dinosaur in the emerging age of main battle tanks, anti-tank rocket technology and latterly helicopter gunships, all of which came to prominence during its production life. It was also an expensive and complex dinosaur compared with the MBTs that were concurrently entering service.

The rear tank may be the same tank photographed in central Plzen, as it also has the ZIP box mounted on the turret as a contingency measure.

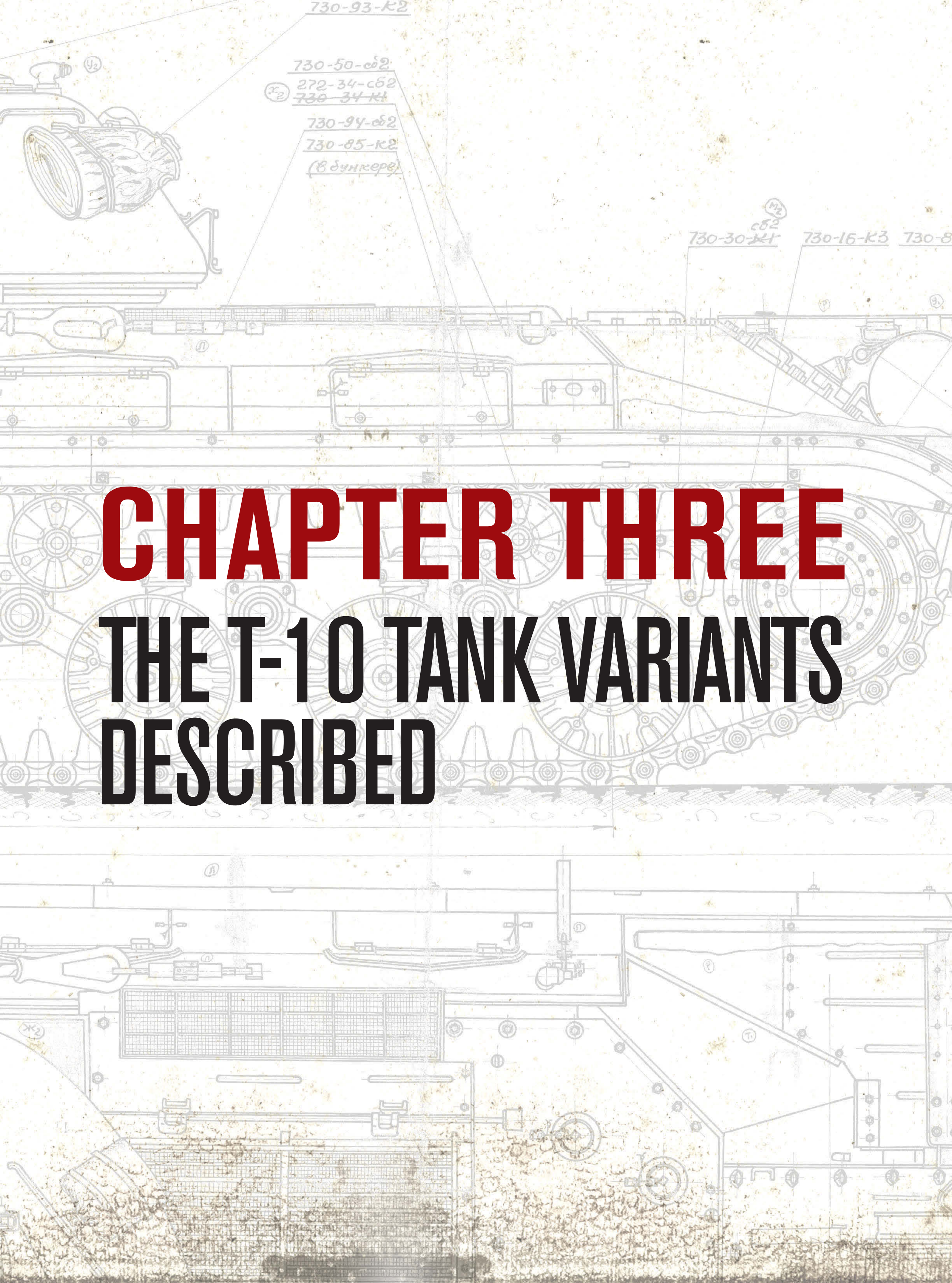
It remained nevertheless a powerful and deadly dinosaur. The tank was in series production for a decade, but like other less well known Soviet tanks such as the T-44 and IS-4 it entered service, served in the Soviet Army and was duly removed from service while all the time under the radar of the typically intense scrutiny afforded most Soviet tanks during the Cold War.



A Soviet illustration of the T-10MK command tank in static deployment.

CHAPTER THREE

THE T-10 TANK VARIANTS DESCRIBED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730-50-сб2
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730-85-К2
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2933

THE T-10 HEAVY TANK – OBIEKT-730

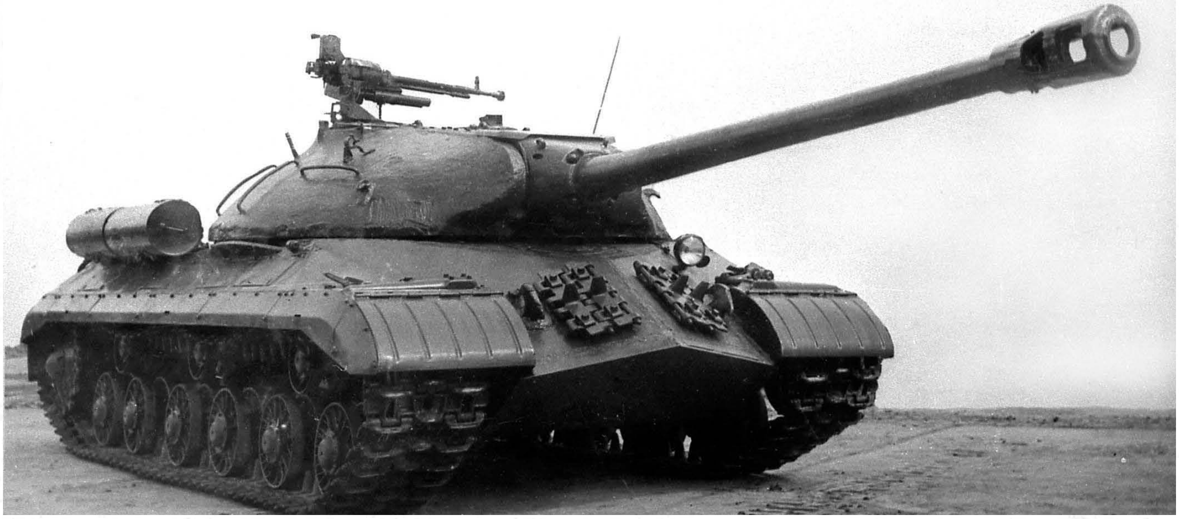
The T-10 had a 'classical' tank layout, with the driver-mechanic's compartment at the front, the fighting compartment and turret in the middle, and the engine/transmission (MTO) compartment at the rear. The T-10 had a crew of four. The driver-mechanic was located on the centreline of the tank, with a hatch located directly above his position. The commander and gunner sat in the turret to the left of the main armament, with the loader to the right. Entry and egress were by means of the two turret hatches and the driver-mechanic's hatch. An emergency escape hatch was located in the hull floor by the driver-mechanic's position.

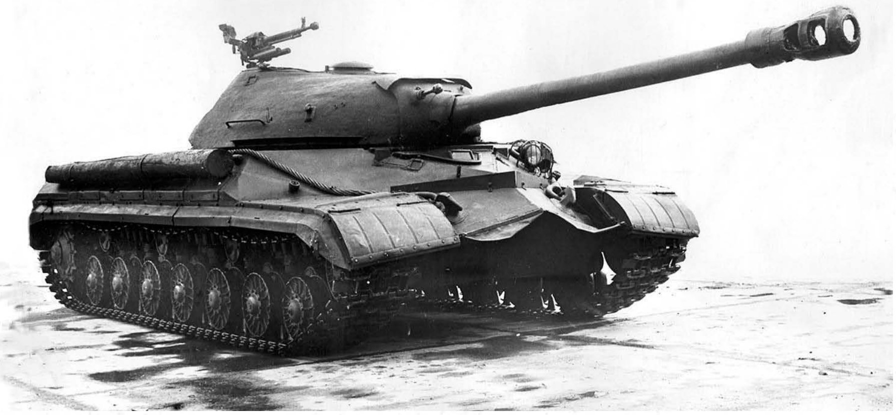
The original T-10 was armed with a 122mm D-25TA gun of 48 calibre length (L/48) with horizontal breechblock and twin recoil buffers. This had a range of motion of +17° elevation and 3° depression, and carried a basic load of 30 rounds of separate loading ammunition using metallic charge casings. The gun, which had a barrel length of 2.465m, fired armour piercing ammunition with a muzzle velocity of 795m/s that could defeat 145mm of vertical Rolled Homogeneous [plate steel] Armour (RHA) at 2,000m. The main gun sight was a TSh2-27 and was part of the TAEhN-1 automatic fire control system to assist gun laying.

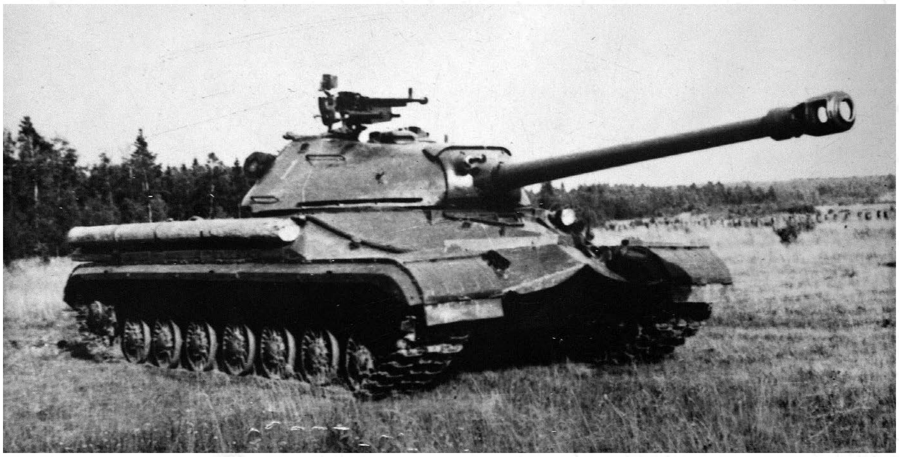
Due to the large and bulky ammunition and cramped turret space, maximum rate of fire was only 3–4rpm even with an electro-mechanical assisted loading system, reducing to 2–3rpm if manual reloading was required. The T-10's basic 30 round ammunition complement included a mixture of AP, AP-C and HE-FRAG rounds.

Maximum theoretical aimed range was 5,000m, but practical tank engagement range was under 1,000m. Indirect fire range was 15,000m using a supplemental artillery chart and an angle-measuring device fitted to the breech inside the turret, should the requirement ever have arisen.

A 12.7mm M-1938/46 DShKM was mounted co-axially with the main armament and aimed with the TSh2-21 sight, and another 12.7mm DShKM was mounted in a rotating ring-mount on the loader's hatch for anti-aircraft defence. The total 12.7mm ammunition complement was 1,000 rounds. Also carried on board were 20 F-1 defensive grenades, a 26mm signal



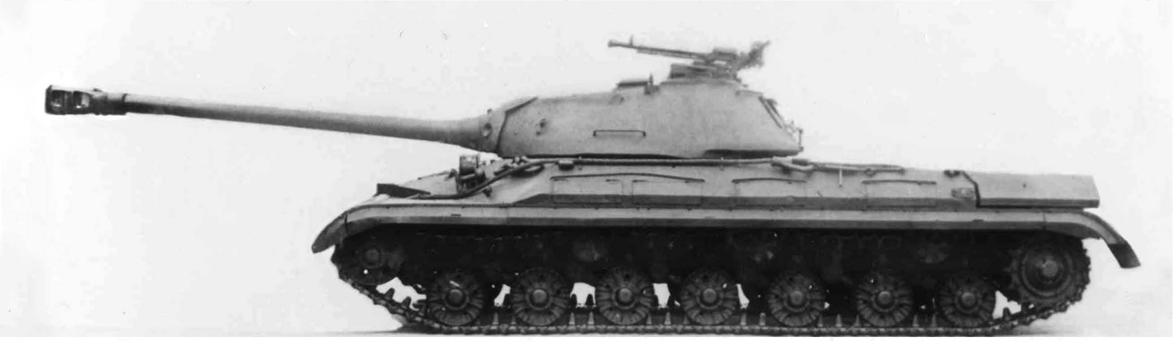


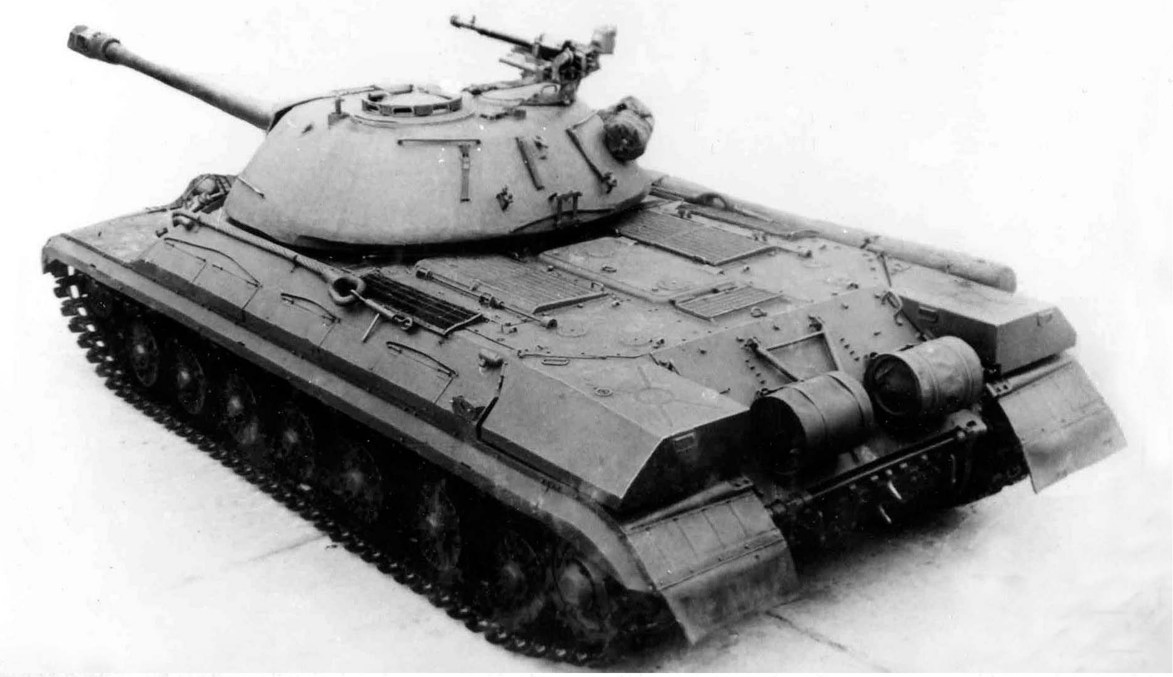


TOP: The T-10 was the production successor to the IS-3M, to which it was generally similar in appearance.

MIDDLE: The initial production model T-10 had a clean turret with distinctive dome ventilator and a gun barrel with double baffle muzzle and no bore evacuator. Note the rubber skirts giving the glacis a distinctive 'duck-billed' shape. Until clear photographs became available, Western military analysts assumed this to be part of the glacis armour shape.

BOTTOM: The T-10 during trials at the NIIBT polygon, Kubinka.



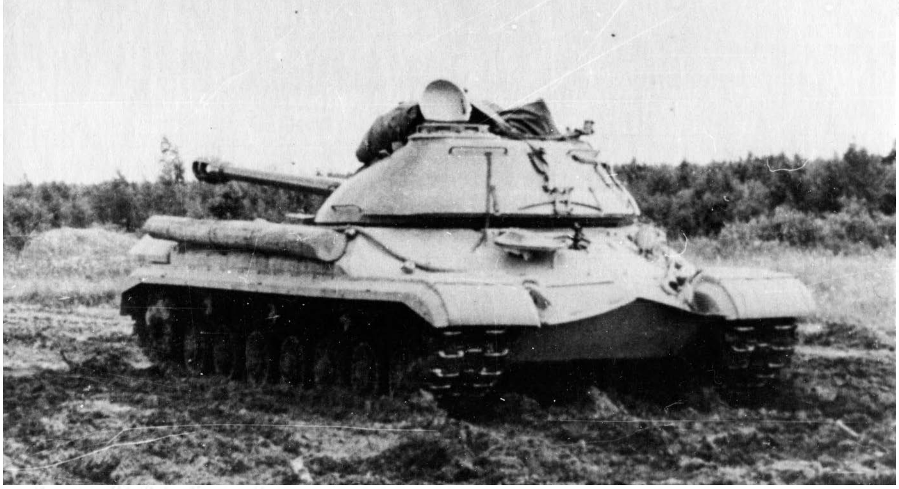


TOP: The T-10 was longer and larger than the IS-3, with an additional road wheel on each side and a new enlarged turret.
ABOVE: This rear view of the original production T-10 clearly shows the slight turret rear overhang, the engine deck and flush external fuel tanks that were a feature of the T-10 series.

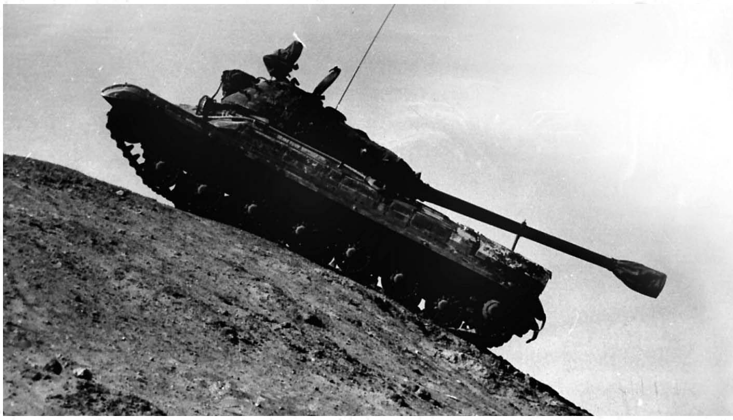
flare pistol and two 7.62mm AK-47s (according to the manual: other sources state four) with 600 rounds of ammunition to complete the tank's armament.

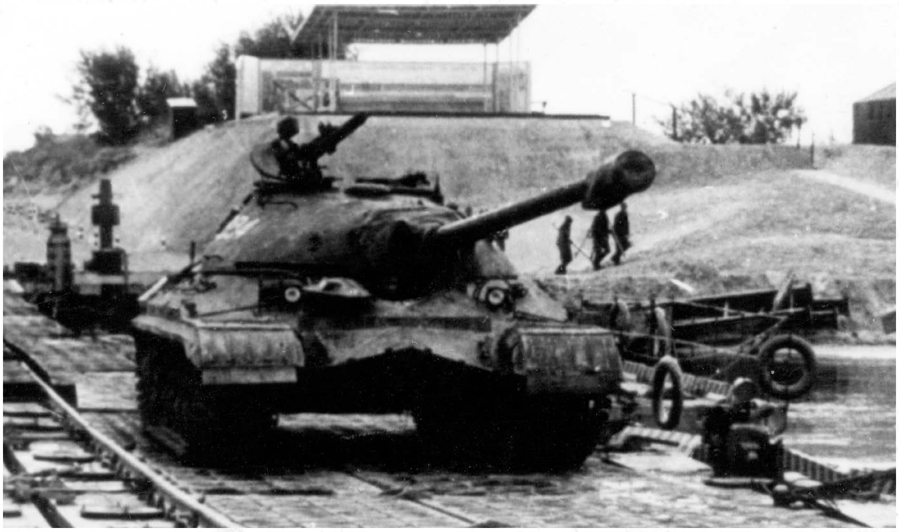
The hull armour was made up of welded rolled armour plates of 120mm, 80mm, 60mm, 50mm, 20mm and 15mm thickness. The T-10 retained the 'schuka' or 'pike nose' configuration used initially on the IS-3 heavy tank. The glacis was made of 120mm armour plate angled at 62° from vertical, the lower glacis angled at 50° from vertical, the upper plates at 55° from vertical at a

A T-10 during evaluation trials with turret traversed to the rear. It was, and remains, standard practice to fit tarpaulins over the turrets of armoured vehicles while under evaluation.

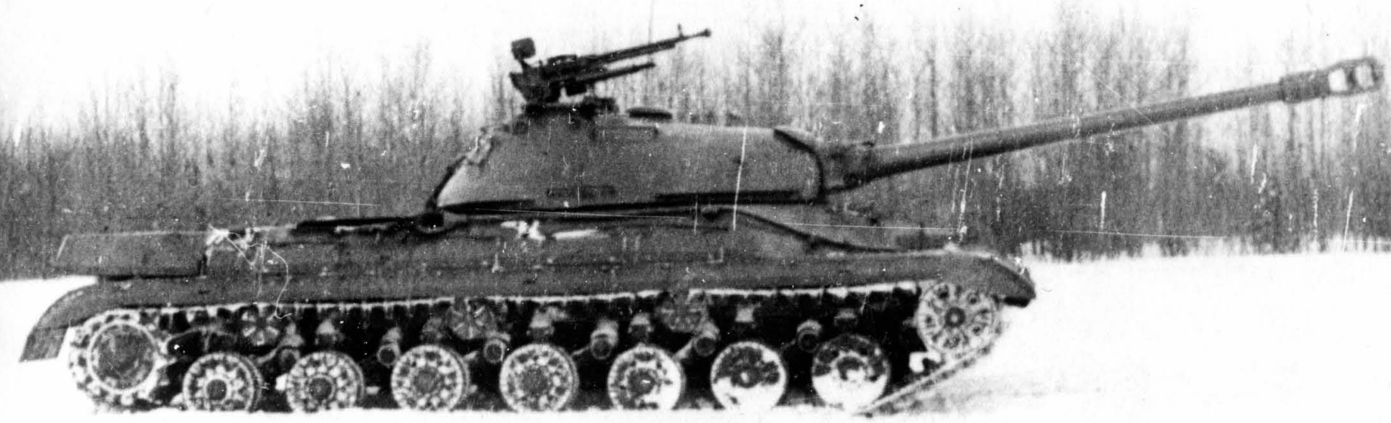


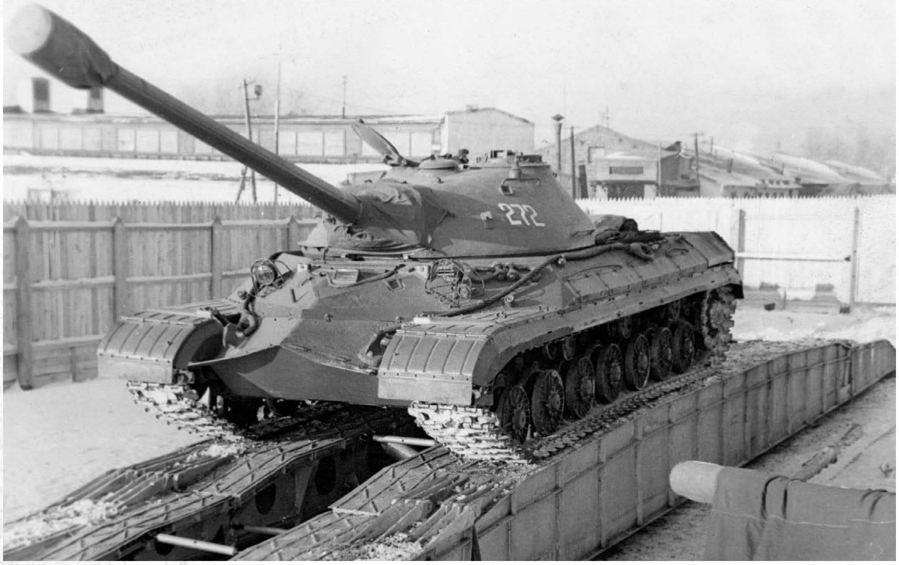
After plant and state testing at Kubinka, it was common practice to send tanks for service evaluation in the Soviet southern republics of Uzbekistan, Turkmenistan and Tajikistan where they could be evaluated under the more arid ambient conditions encountered there. This T-10 tank is undergoing such service evaluation guarantee trials with the Soviet Army in the Mari region of Soviet Turkmenistan.





A T-10 crossing an NZhM-56 railway bridge during Soviet Army exercises.



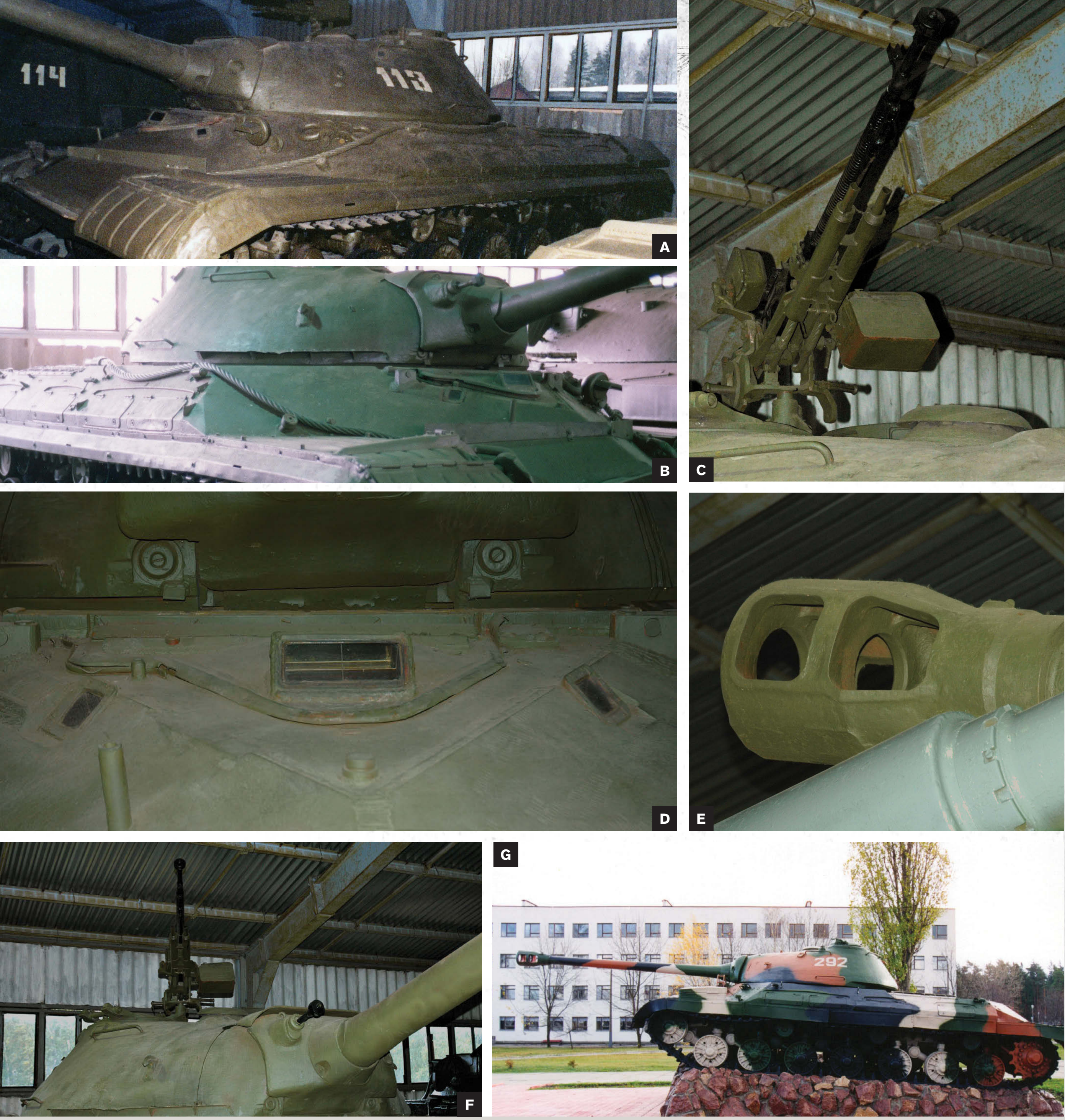


ABOVE AND PAGES 62–63: The T-10 during winter trials. The early production T-10 featured relatively clean lines compared to the later T-10M with its more complex armament, sighting and night vision equipment.

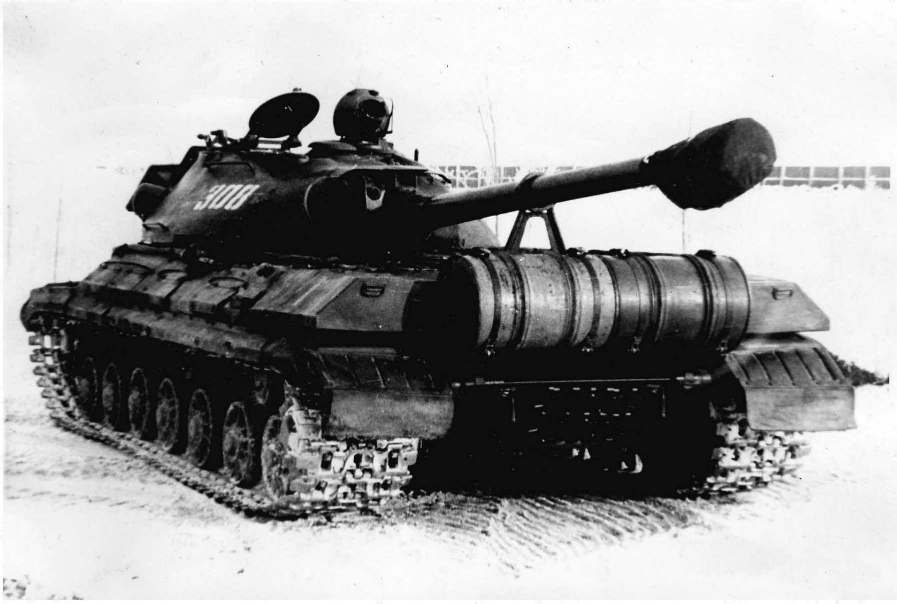
LEFT: This early T-10 is being used in testing of the prototype TShM tank mounted bridgelayer system, which did not ultimately enter service.

rearward slope of 40°. Most tanks were fitted with splash deflectors constructed of rubber with steel reinforcement, mounted to the lower edges where the three armour plates joined. Due to damage and the crew using them as step plates they tended to become deformed, which caused early Western drawings of the tank to have a very peculiar 'duck beak' at the front of the hull due to the appearance created by these splash deflectors, which is obvious when observing photographs today in retrospect, but was not at the time.

The hull side armour above the track was 120mm at 47° from vertical; however, the upper sections were bent back on each other to form a bulge and create thicker armour above the fender line, like that of the IS-3.



(A) After trials, a T-10 and a later T-10M were kept at the NIIBT museum at Kubinka together with several other prototypes. This photograph showing Tank No. 5504A105 was taken in 1994 when the museum was still under military control and access was highly restricted. **(B)** Early T-10 tanks can be readily identified by the clean gun barrel, and the use of 12.7mm DShKM secondary armament, replaced by the 14.5mm KPVT on the later T-10M. **(C)** The 12.7mm DshKM located on the turret roof provided the early T-10 with anti-aircraft cover. **(D)** The driver-mechanic's position and hatch on the T-10 are less restrictive than on the IS-3. **(E)** The 122mm D-25TS tank gun with its double-baffle muzzle brake as used on the early T-10 was first installed in the IS-2 in 1943. **(F)** Secondary armament on the T-10 and modified T-10A and T-10B was the 12.7mm DShKM, for both co-axial and turret mounted AAMG use. **(G)** Remarkably, most early T-10 tanks were not upgraded and some survive today in their original form. This early T-10 is located on a military base at Goncharovskoe in Ukraine. The engine has been removed, together with the original engine deck, but the tank is otherwise complete.



A T-10 fitted with auxiliary long range fuel tanks on the hull rear.

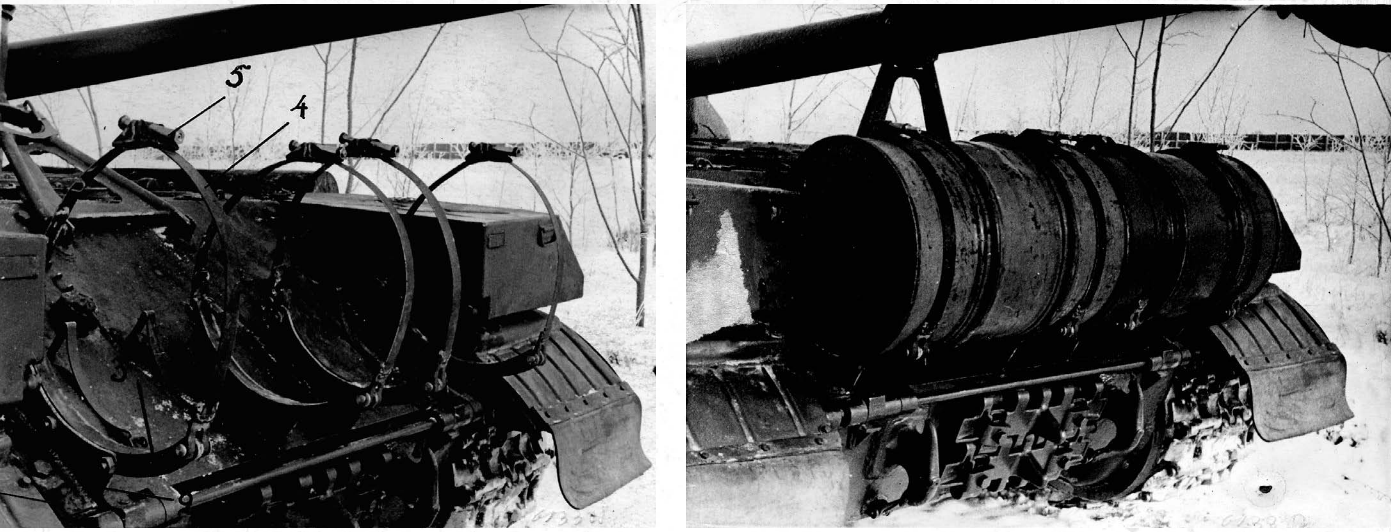
The lower plates were 80mm set vertical and at chamfered at 62° from vertical. The rear armour was 50mm armour plate, the upper plate at 55° and the lower plate at 20° from the vertical. The hull roof was 30mm in the region of the turret, 20mm above the MTO. The hull floor was 16–20mm.

The internal armoured volume of the tank was 12.72m^3, divided between 1.35m^3 for the driver-mechanic, 6.86m^3 for the fighting compartment and 4.51m^3 for the engine/transmission (MTO) compartment.

The turret was cast from MBL-1 grade hardened steel with a maximum thickness of 250mm. The frontal armour was 200–135mm in thickness angled at 24–49°, providing an effective thickness of over 275mm, the sides 157–100mm at 40–60°, the rear 90mm at 40°, and the welded-in roof plate 30–40mm. The hull and turret armour had a combined weight of 25.55 metric tonnes, some 51 per cent of the tank's overall combat weight.

A TPV-47 panoramic sight and two vision blocks were located in the fighting compartment. The commander's cupola was provided with a TPKU sight and seven vision blocks. The gunner had a telescopic gun sight and a vision block in the left of the turret. The loader had two vision blocks. The driver-mechanic was provided with a TPV-51 vision device in his hatch roof and two TIP viewing blocks mounted in the upper hull glacis.

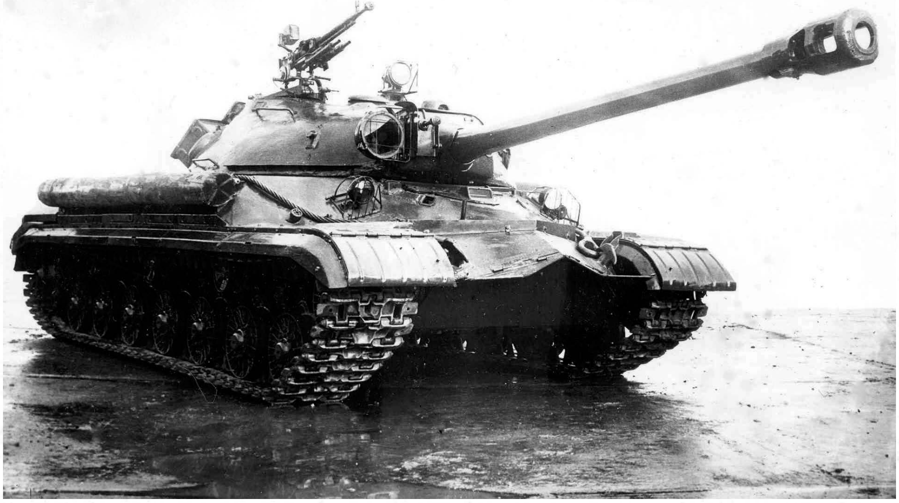
The V-12-5, four-stroke, liquid cooled diesel engine developed 700hp; starting was via an ST-700 electric starter or air starter using two 5 litre compressed air cylinders. A pre-heater was provided for cold temperature starting. The early production T-10 had a fuel capacity of 760 litres (2 x 185 litre and 1 x 90 litre



ABOVE LEFT AND RIGHT: The auxiliary fuel tanks were held in place by two bands for each tank.

internal tanks, plus two rear external fuel tanks with 150 litres each), with the two 185 litre internal tanks being enlarged to 270 litres each during a June 1955 re-design, increasing overall fuel capacity by 170 litres to 930 litres. There are some inconsistencies in available data; however, according to the Operator's Manual, the T-10 originally had 460 litres of fuel under armour, which was increased from June 1955 to 630 litres due to the aforesaid re-design of the MTO compartment, so that from that date fuel capacity was 630 litres internal and 300 additional litres located in external tanks, for a total of 930 litres. Road ranges were nevertheless shorter than desired, initially only 240km reducing to 120–160km on dirt roads. In 1958 external long range fuel tanks – 200 litre drums – were fitted on several tank types including the T-10 and tested in the Baltic and Belarusian military districts. With the later larger tanks and the 400 litres of auxiliary fuel road range was about 420km.

An interesting technical feature of the T-10 design was that the engine was designed to use a new concept called ejection cooling. The use of a fan to force air through a radiator was known to bleed off as much as 50hp from the main engine as well as require a lot of extra space and most critically weight, as it all had to be under armour. The ejection cooling concept utilized the exhaust flow from the engine to draw in air through a system of venturis that pulled cool air through the radiators and then expelled the now heated air together with the hot exhaust fumes. After trying the concept on a modified ISU-152 self-propelled gun in 1946, the T-10 and the PT-76 amphibious tank were the first to use the concept in practice. This permitted both designs to be lighter (essential in the case of the PT-76) and smaller than if they had been fitted with conventional fan cooled radiators.



LEFT: An early production T-10 modernized with infrared night-fighting for the armament, as more commonly seen on the T-10M.

LEFT BELOW: An early T-10 with 12.7mm DShKM AAMG installed on the turret.

An automatic PPO fire extinguisher system was fitted in the MTO compartment, with the triple cylinder PPO system triggered by excessive heat. A single OU-2 hand fire extinguisher was also provided in the fighting compartment.

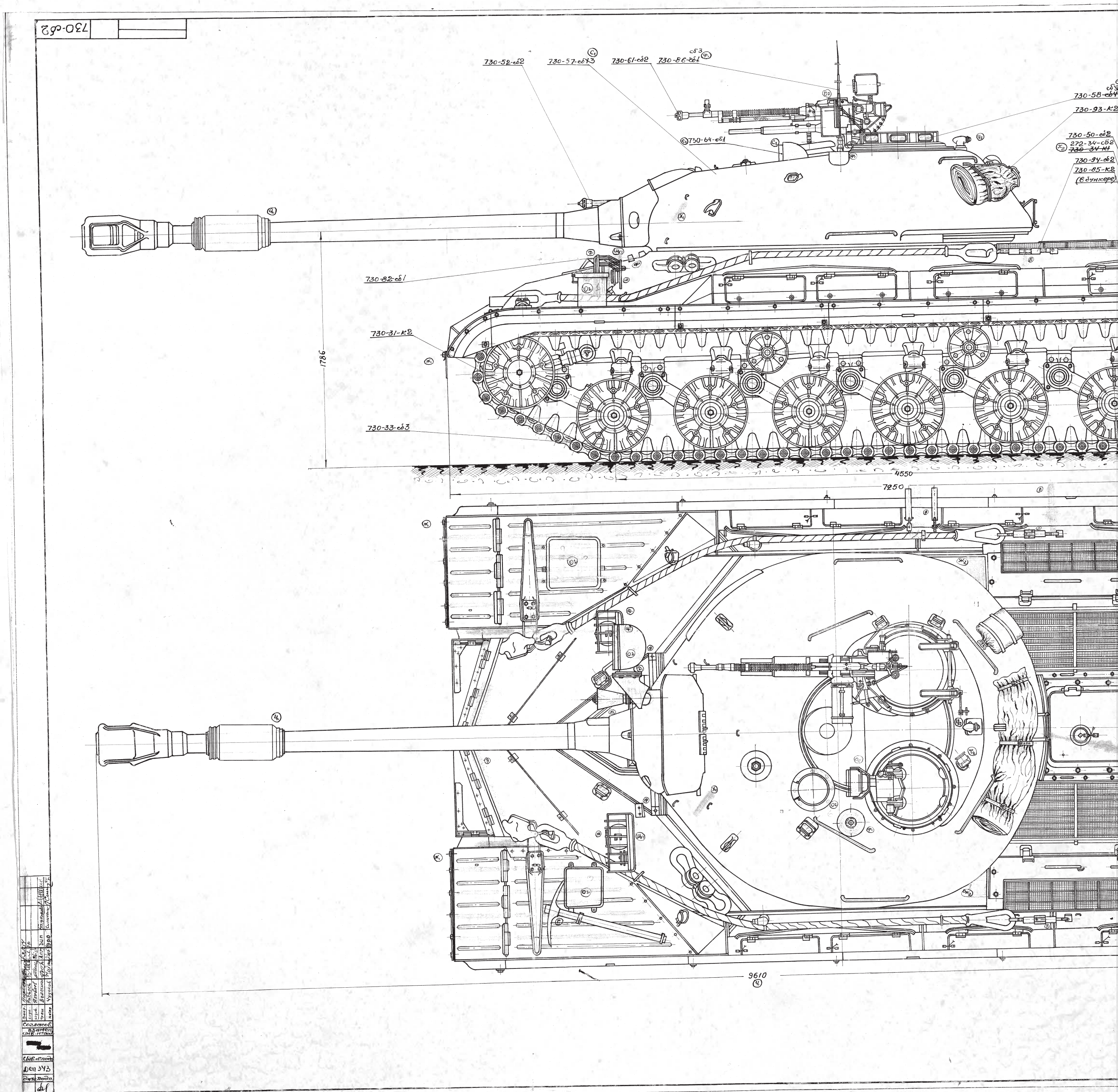
Transmission was by means of an 8-speed planetary gearbox arrangement mounted together with a 'ZK'-type turn mechanism and conventional reduction-type final drives. The T-10 did not have a conventional main clutch assembly. During capital rebuilds in the 1960s, the original 8-speed transmission was replaced by a simpler and easier to service 6-speed transmission with a main friction-type clutch.

Torsion bar suspension was used, with the torsion bars being the more complex and expensive bundled type rather than monolithic bars. The tank had seven road wheel pairs each side and three return rollers, with four 'spade'-type lever action hydraulic shock absorbers on the leading and trailing wheel stations (the corners of the hull at stations 1 and 7). It used a rear drive sprocket and front mounted adjustable idler to set track tension.

The cast steel 'OMSh' tracks were 720mm wide, with 88 links per side when new. Ground pressure was 0.77kg/cm². Due to the tank's not insignificant weight, the tracks could be fitted with bolt-on track extensions, which reduced ground pressure to 0.55kg/cm².

The T-10 was eventually fitted with a TDA direct injection system using diesel fuel for providing smoke screens, augmented by two BDSh-5 smoke containers mounted on the hull rear plate.

BELOW: A Soviet ChKZ plant drawing showing the Obiekt-730sb2, an upgrade of the original Obiekt-730 (T-10) and incorporating the elements of the Obiekt-731 (T-10A) and Obiekt-733 (T-10B), including full infrared night operation equipment for the gunner and the driver-mechanic. Note also the engine deck access plate changes.


730-сб2
730-52-сб2
730-57-сб43
730-61-сб2
730-86-сб1
730-64-сб1
730-58-сб4
730-93-к2
730-50-сб2
272-34-сб2
730-94-сб2
730-85-к2
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730-31-к2
730-33-сб3
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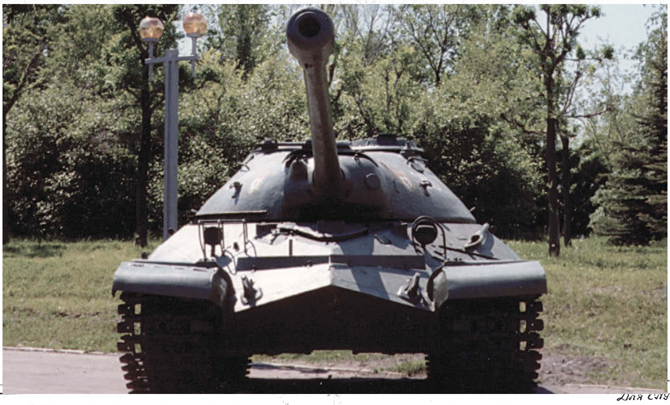
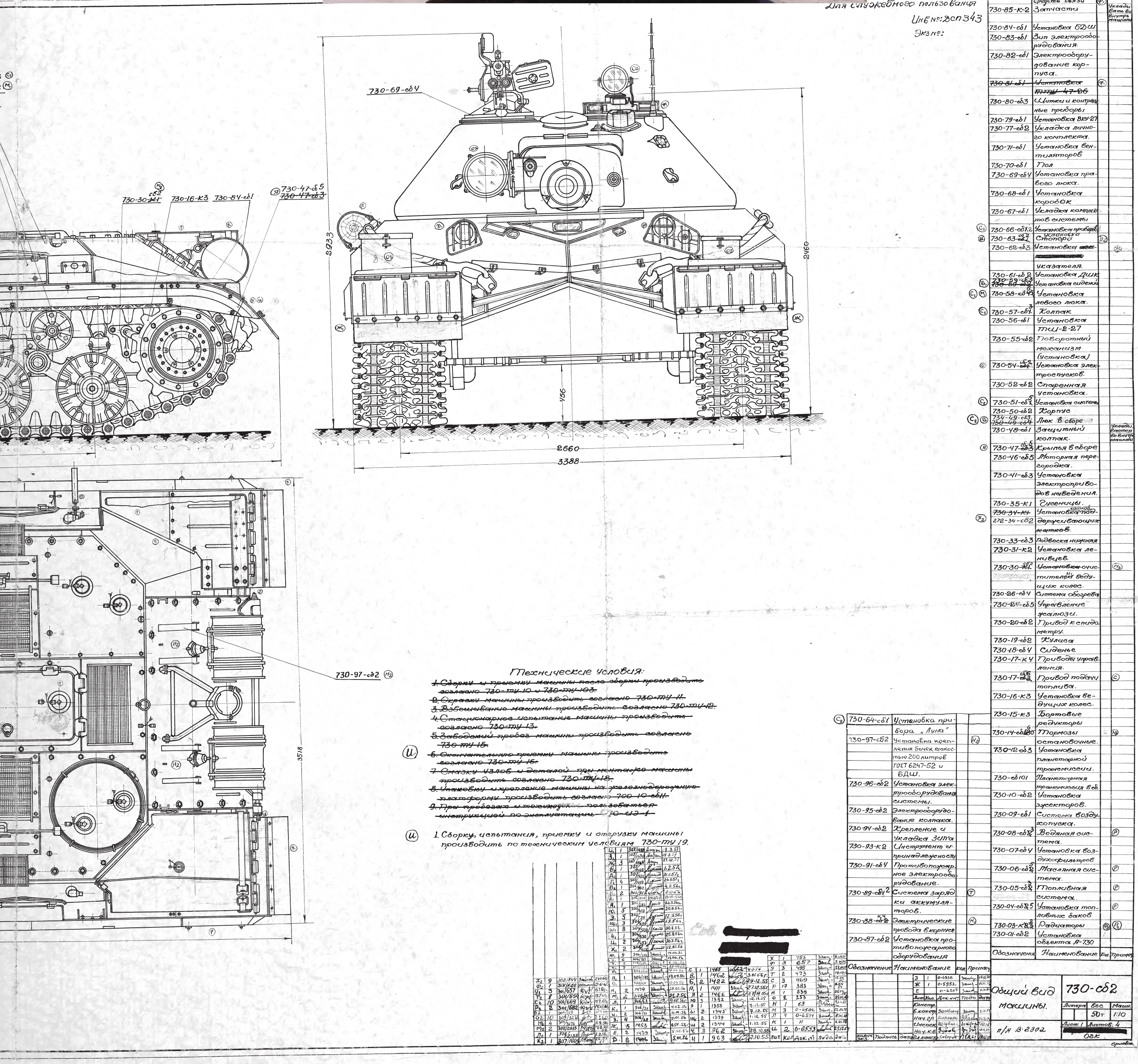


The evolution of the T-10 from the IS-3 is clearly evident in this view of a T-10 located in Saratov.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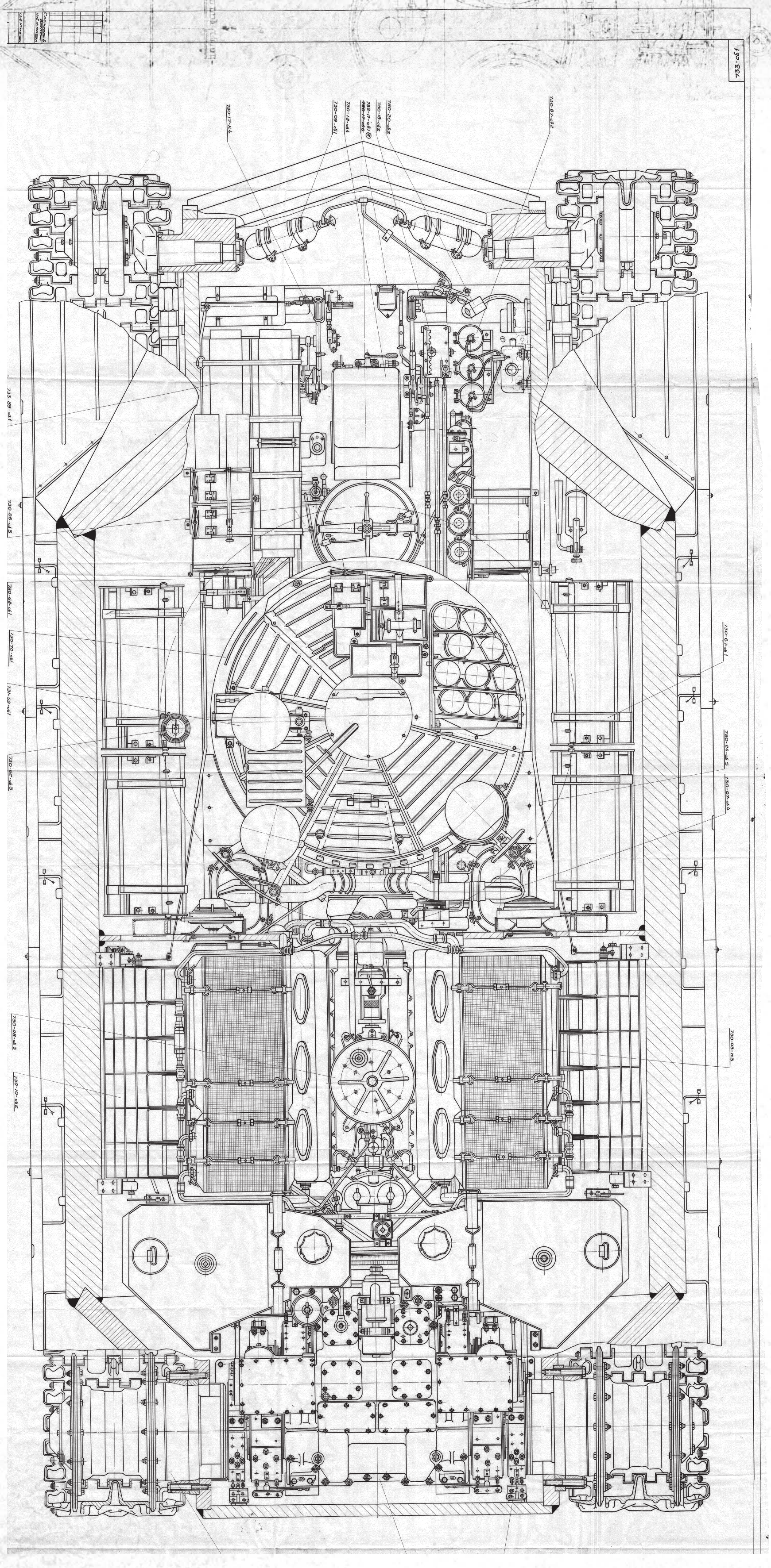
Инв №: дсп 343
Экз №:
730-69-сб4
730-30-К1
730-16-К3
730-84-сб1
730-47-сб5
730-97-сб2
2933
2460
456
2660
3388
3518
Технические условия:
~~1. Сборку и приемку машины после сборки производить согласно 730-ТУ-10 и 730-ТУ-103.~~
~~2. Окраску машины производить согласно 730-ТУ-11.~~
~~3. Взвешивание машины производить согласно 730-ТУ-12.~~
~~4. Стационарное испытание машины производить согласно 730-ТУ-13.~~
~~5. Заводский пробег машины производить согласно 730-ТУ-15.~~
~~6. Окончательную приемку машины производить согласно 730-ТУ-16.~~
~~7. Смазку узлов и деталей при монтаже машины производить согласно 730-ТУ-18.~~
~~8. Упаковку и крепление машины на железнодорожную платформу производить согласно 700-10-сбИ.~~
~~9. При пробегах и тяжиходах пользоваться инструкцией по эксплуатации~~
1. Сборку, испытания, приемку и отгрузку машины производить по техническим условиям 730-ТУ 19.
Обозначение
Наименование
Кол.
Примеч.
Общий вид машины.
730-сб2
Литера
Вес
50т
Масш.
1:10
Лист: 1
Листов: 4
п/я В-2302
[redacted]
ОГК


733-сб1
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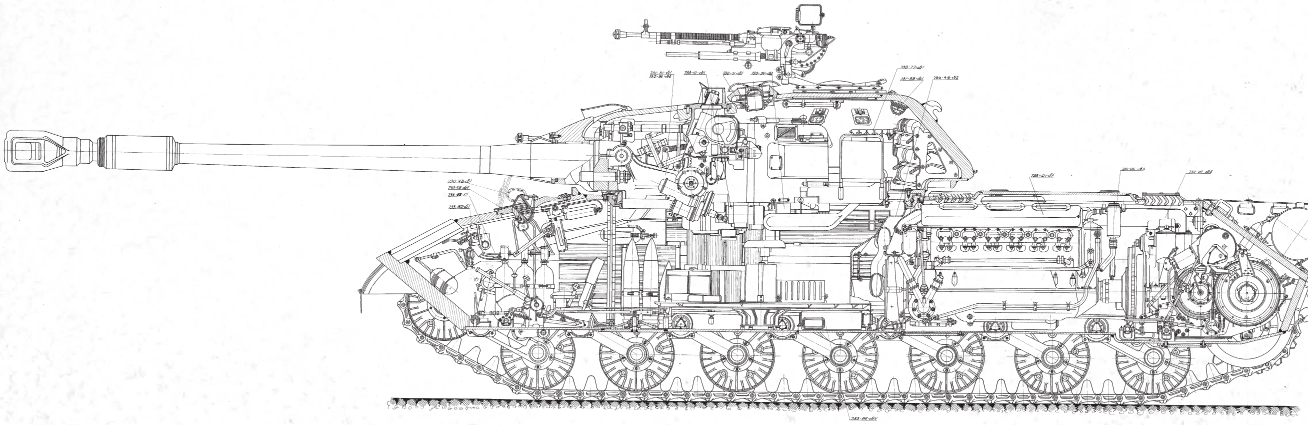
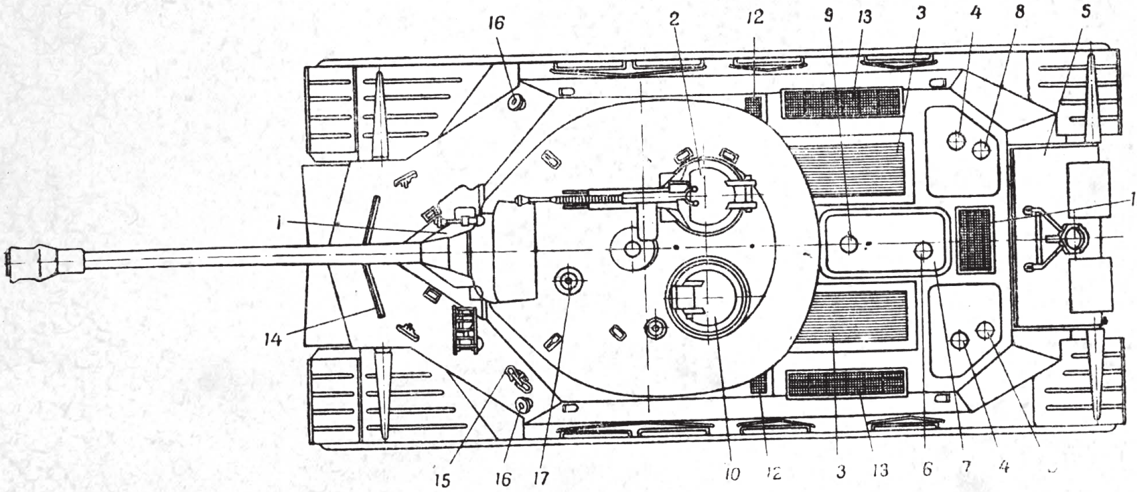


OPPOSITE AND ABOVE: Side elevation and plan interior drawings of the Obiekt-733sb2 (T-10B). The drawings are LKZ plant drawings using the ChKZ plant designator rather than the in-house LKZ designator.

Communications consisted of a 10 RT-26Eh radio and TPU-47-2 or TPU-47-26 laryngaphone with headsets for each of the four-man crew. The radio was later replaced with the R-113 set. Internal communications were later via a TPKU set. The vehicle had an engine driven G-731power generator providing 1.5kVt of power.

After its acceptance for service with the Soviet Army in 1953, series manufacture followed as the T-10 from 1953 to 1957. The early production model was without gun stabilization and is most readily distinguished by its entirely clean barrel with double baffle muzzle brake, with the turret being devoid of the additional sighting ports of later tanks.



Soviet era early T-10 plan view showing the various fuel, oil and mechanical access points on the early T-10.

T-10A HEAVY TANK (OBIEKT-267SP1 AND OBIEKT-731)

The T-10A was developed via the Obiekt-267 prototype at the KB (OKBT) at LKZ under the direction of Iosef Kotin. As it entered series production, the T-10A virtually replicated the final production models of the original T-10, with some major and some minor changes.

The most obvious change was the replacement of the D-25TA gun with the D-25TS, which was modified for use with a single-axis (vertical plane) stabilizer. This was connected to the PUOT (PUOT-1) 'Uragan' (storm) vertical axis gun stabilizer and fire control system. This system included the TPS-1 gyroscopically stabilized optical periscope gunner's sight, which replaced the TSh2-27, and the TAEhN-2 automated power drive and electronic aiming system. A redundant direct fire telescopic sight designated the TUP-21 was provided as back-up to the main system in the event of component or power failure.

Stabilization of the main gun when moving was accurate to within 0.01° to 3°, based on speed of movement and terrain features. Turret rotational speed was from 0.05° to 14° per second.

The gun had a maximum direct fire range of 5,000m, and the co-axial DShKM 12.7mm machine gun could be used out to 2,000m with the sighting system. The T-10A was estimated to be five to six times more effective and accurate when firing on the move with the stabilized gunnery system.

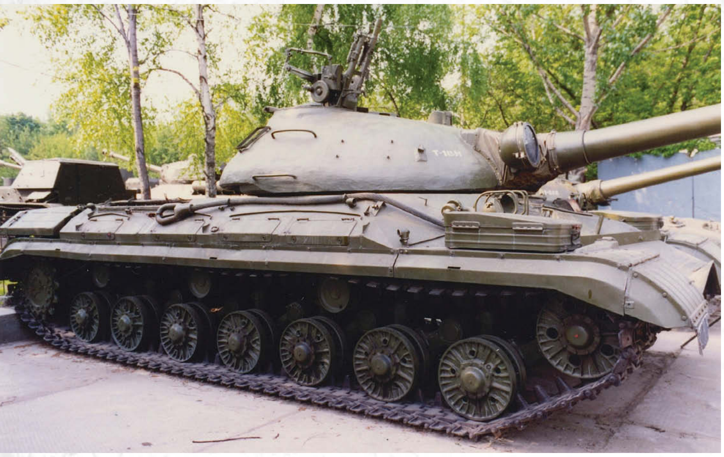
Using the TUP-21 sight, direct fire range reduced to 3,400m with the main gun, and 1,000m with the co-axial machine gun.

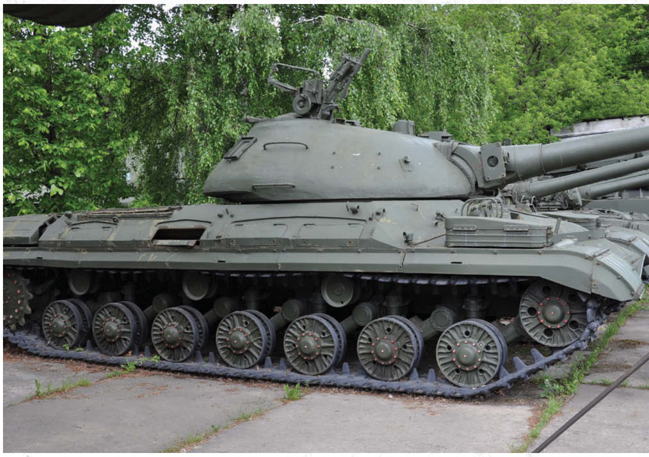
The original ST-700 starter was replaced by a ST-16M and the 1.5kVt G-731 generator by the 3kVt G-74 type. The 10RT-26Eh radio was replaced by the new R-113 VHF FM radio set and the TPU-47-2 by the new R-120 crew intercom system. Internal fuel stowage was increased by 180 litres.

The driver-mechanic was meanwhile provided with a GPK-48 gyroscope and a TVN-1 infrared night driving light. The T-10A was produced at ChTZ in Chelyabinsk (which referred to the tank as the Obiekt-731), with only 50 built in total, some of which were later upgraded in service.

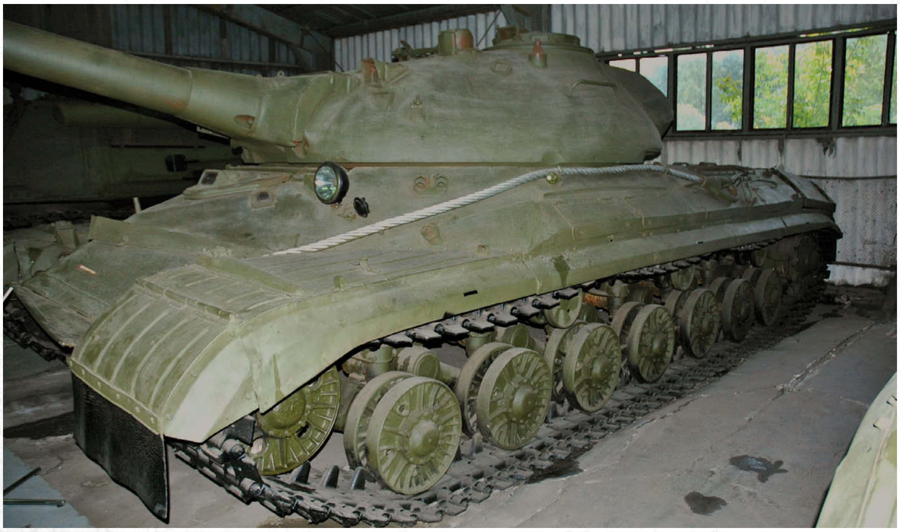
T-10B HEAVY TANK (OBIEKT-267SP2 AND OBIEKT-733)

The T-10B was developed at the OKBT of LZK in 1954–55, again under the direction of Iosef Kotin, under the designation Obiekt-267sp2. The prototype was completed in 1956 with the tank being accepted into Soviet Army service in 1957. It was produced for one year only, at ChTZ in Chelyabinsk (which referred to the tank as the Obiekt-733), with a total of 110 built.

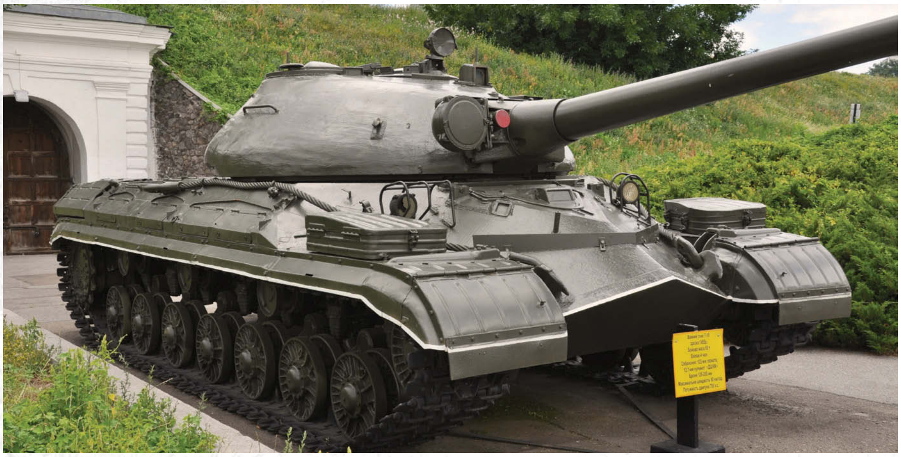




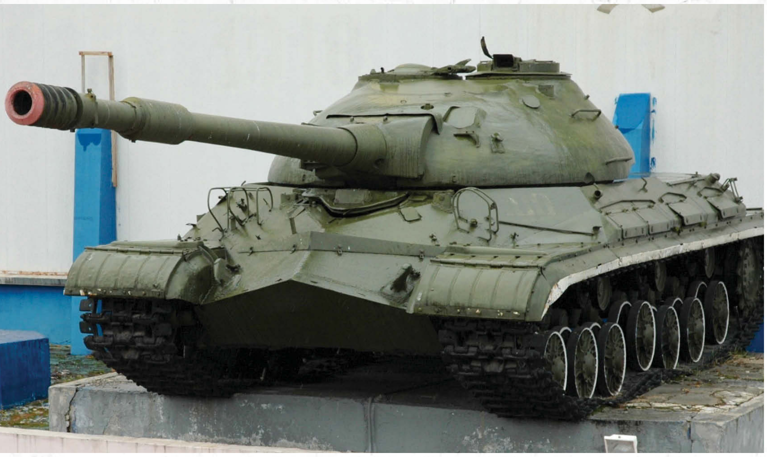
ABOVE LEFT AND RIGHT: The T-10M located at the Central Armed Forces Museum in Moscow, as it arrived in 1993 and as it looked nearly 20 years later. The tank was delivered fresh from strategic reserves in service condition.

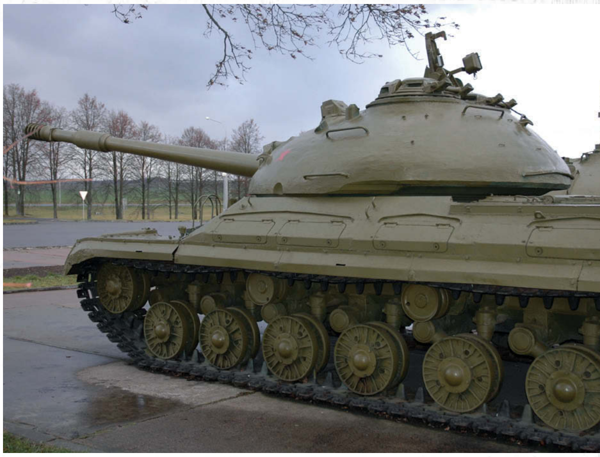


LEFT: The T-10M at Kubinka is a development prototype with non-standard features.



BOTTOM: The T-10M at the Great Patriotic War Memorial Museum in Kiev was also delivered fresh from strategic storage.





TOP RIGHT: The T-10M today located at Kurgan Slava near Minsk in Belarus has many features that differ from other preserved examples, the drive sprockets being a case in point.

TOP LEFT: The T-10M at the Izmailova Sports Stadium in Moscow, devoid of its optical equipment.

The T-10B replicated the design features incorporated in the T-10A, but with the single-axis gun stabilizer system now replaced with the new two-axis (vertical and horizontal plane) PUOT-2 'Grom' (thunder) system. This used the integrated TPS-1 sight as previous, coupled to the T2S-29-14 gun sight with automatic vertical drive and horizontal stabilization, but also added a remote control system for the commander, so either the gunner or commander could operate the armament.

Due to the increased power demand of the new system, the 3kVt G-74 generator was replaced by the more powerful 5kVt G-5 generator.

A small number of T-10BK command tanks were produced, with additional communications equipment and a smaller ammunition complement.

T-10M HEAVY TANK (OBIEKT-272 AND OBIEKT-734)

The T-10M was again developed at the OKBT of LKZ, in 1955, as before under the direction of Iosef Kotin. Though this was unknown at the time, it was to

become the last series production Soviet heavy tank. In development at LKZ it was known as the Obiekt-272, with the prototype completed in 1957. It was taken into service with the Red Army by order of the Soviet MO USSR on 26 September 1957, and was series manufactured at ChKZ (where it was known as the Obiekt-734) from 1958 to 1965, and at LKZ in Leningrad from 1958 to 1962. From 1962, both plants continued to build the T-10M, but standardized on the Obiekt-272 specifications in order to unify spares and thereby ease the problem of repairs in the field. A cursory glance at the entirely different parts lists and nomenclature on the respective plant drawings for the two tank plants producing essentially the same tank clearly shows why the change was necessary.

Though essentially an upgrade of the T-10B, the T-10M was a major re-design of the T-10 series tanks as it received a large number of new systems and components. In a similar manner to the T-54 to T-55 re-design, the tanks looked nearly identical but were a generation apart.

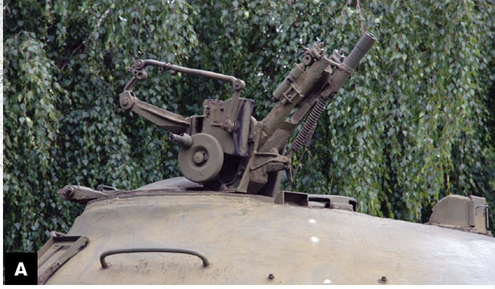
While earlier T-10 tanks were in some cases upgraded with infrared searchlights and sights, the T-10M was so equipped from the outset. The driver-mechanic was provided with a TVN-2T night vision device and an FG-100 IR headlight on the right side of the hull glacis for night driving. The commander was provided with a cupola mounted OU-3T searchlight and a TKN-1T night vision device replacement for his day sight (he had to remove and replace them himself). The gunner was now provided with a TPN-1-29-14 'Luna' periscope night sight and an L-2 searchlight to the right of the main gun for night firing.

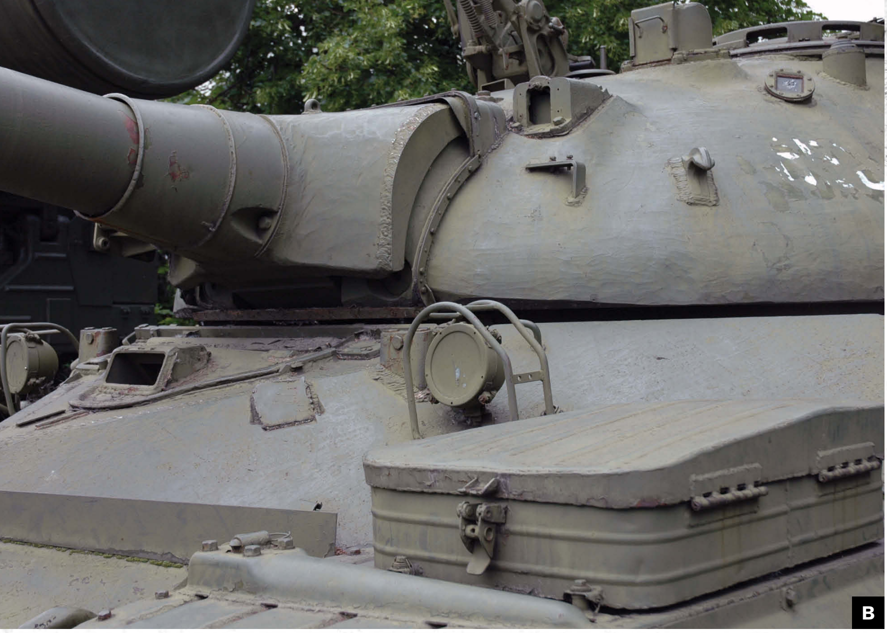
For battlefield observation the gunner had a TPB-51 periscope sight and the loader had a TPN vision block; the commander had a TPKU-2 sight/periscope and seven TPN vision blocks. For night vision a TKN-1 IR night sight was added, with an OU-3T lamp mounted on the commander's cupola.

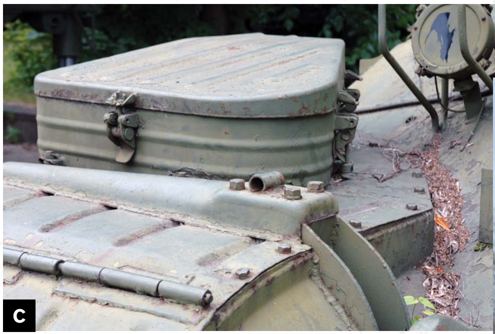
The tank was now fitted with the 122mm M-62-T2 rifled tank gun with improved ballistics, and a co-axial 14.5mm KPVT machine gun replaced the earlier 12.7mm DShKM. A second 14.5mm KPV was on a special anti-aircraft mount with a VK-4 ring sight, and a PU-1 optical sight was fitted to the loader's hatch of every fifth T-10M heavy tank. The new gun provided a massive increase in firepower over the D-25 series and, when used as an artillery system firing HE rounds, could fire out to 15,000m. Elevation arc was now -4° to +15°. Maximum aimed range was 5,000m and direct fire range was 1,130m against a 2m high target (this was defined as the point where the tank had a 50 per cent probability of destroying its target with one shot). The rate of fire was reduced to only two to three rounds per minute even with electro-mechanically operated automatic ramming. Turret rotation was variable from 0.05°–18°/s with an auto-stop over the rear deck plate.

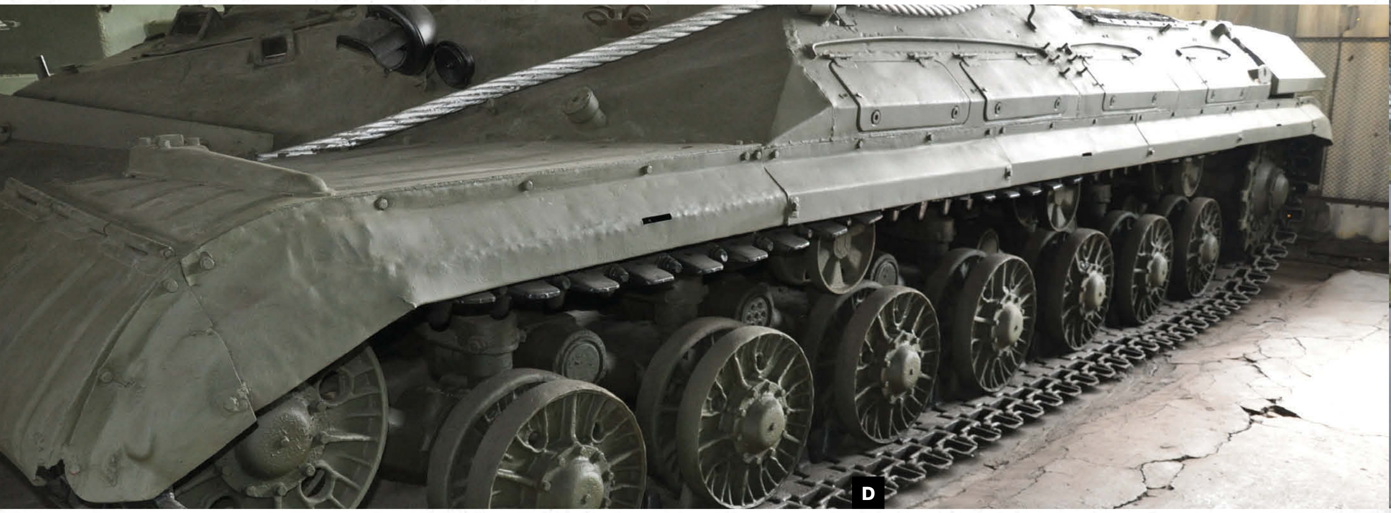
OPPOSITE LEFT: The distinctive T-10 series glacis plate with the additional splash defector, which is made of rubber with metal reinforced edging.

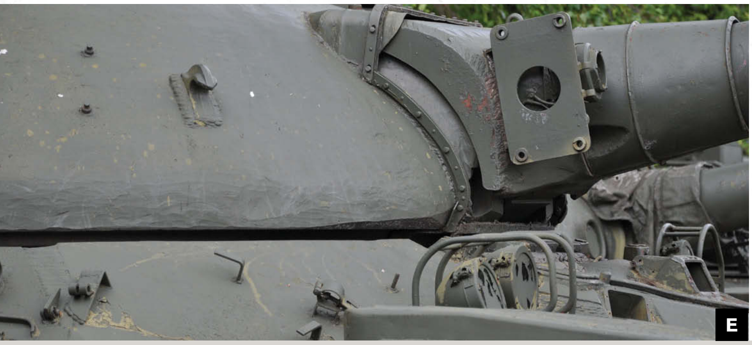
OPPOSITE RIGHT: The side pannier storage on the T-10 series is built out from the hull rather than simply filling the gap as on the IS-3 heavy tank.

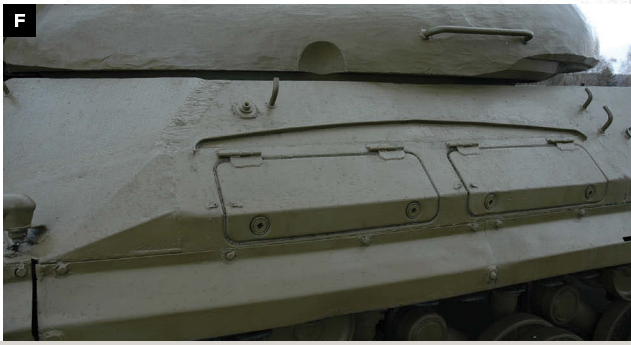




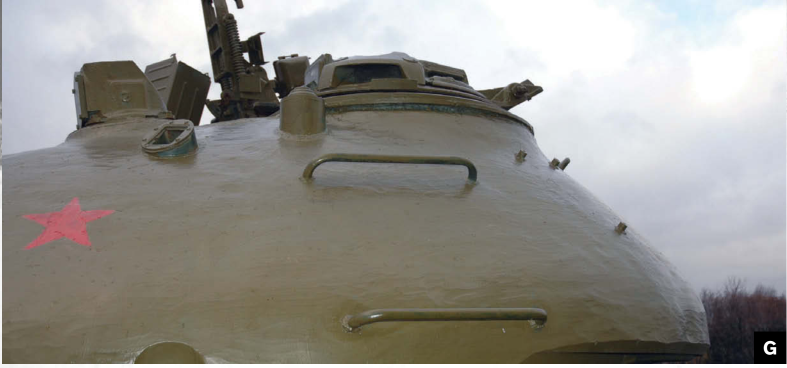


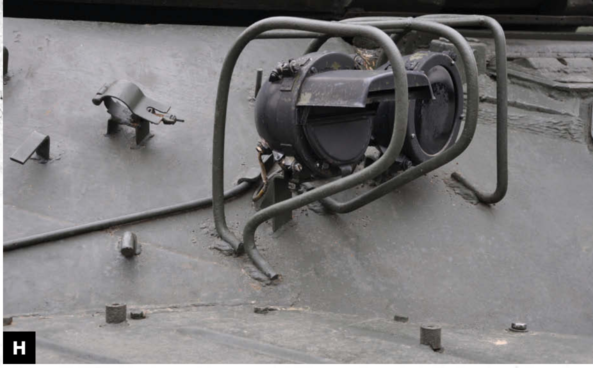


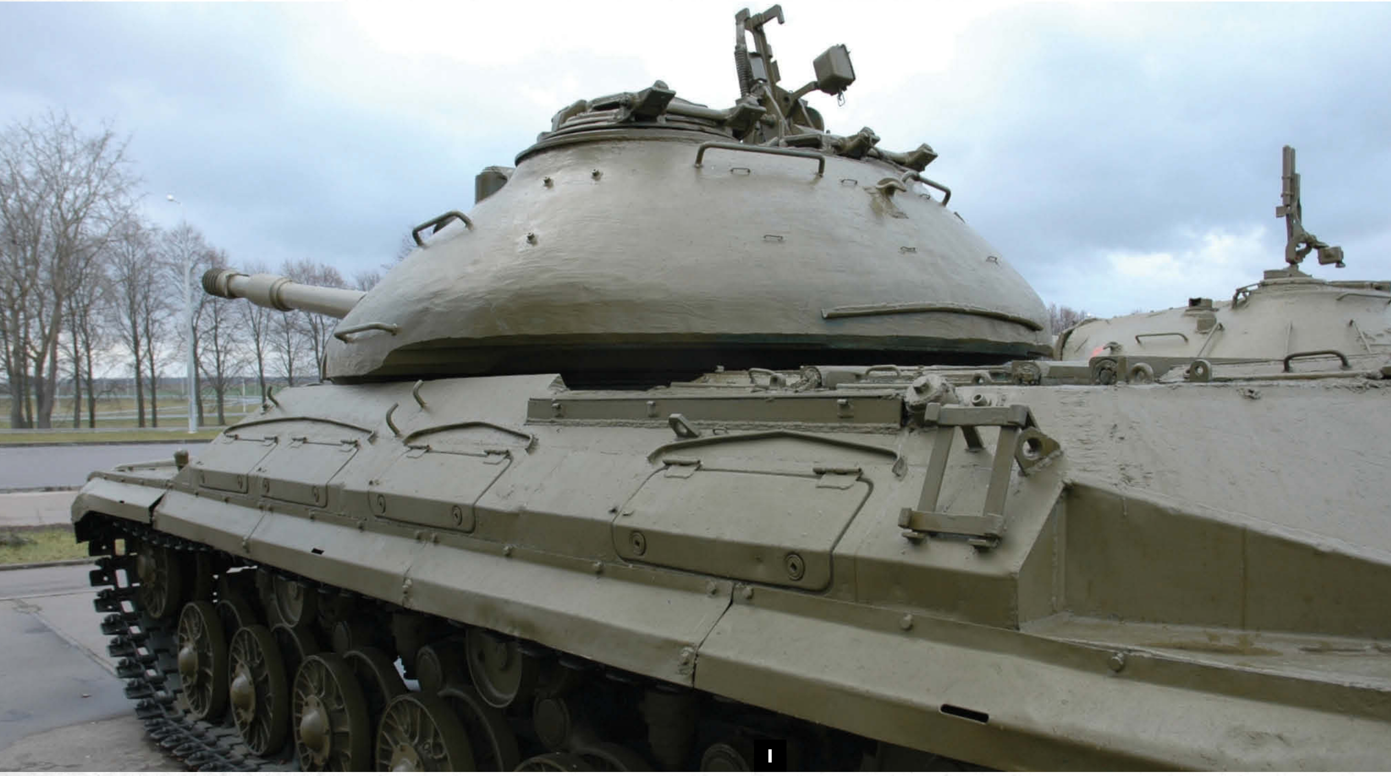


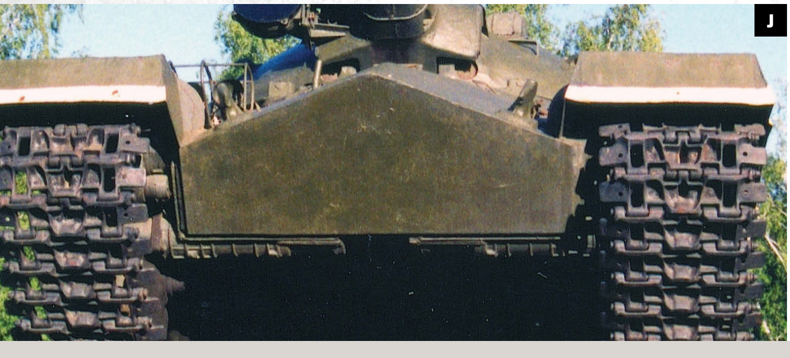


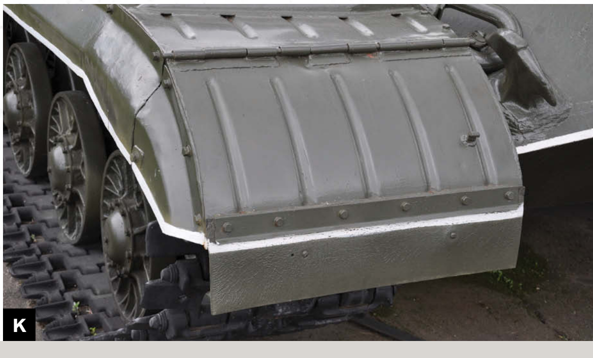
(A) The right side of the T-10M is free from the optical fire control and observation equipment mounted on the other side of the turret. The PZU-7 mounting for the 14.5mm KPVT AAMG is still intact on this tank located at the Central Armed Forces Museum, Moscow. **(B)** The T-10M gun mantlet was covered with a canvas shroud in service. **(C)** The purpose ZIP boxes were usually located on both track guards. **(D)** The T-10 series has a longer hull than the IS-3 that it replaced in service, and an additional wheel station on each side. **(E)** The mounting bracket for the L2 infrared night vision searchlight, which was standard equipment on the T-10M and was also fitted to some earlier T-10B tanks. **(F)** The side pannier storage lids, protected by individual rain channels. **(G)** The T-10M turret surface texture is far from smooth, almost resembling whittled wood, which considering the turret casting process is not unsurprising. **(H)** The T-10M was fitted with infrared night fighting and driving capability as standard, as introduced on the T-10B. **(I)** The T-10 series has a distinctive chamfered hull shape, saving considerable armour weight. **(J)** The 'schuka' pike-nose of the T-10 series was a



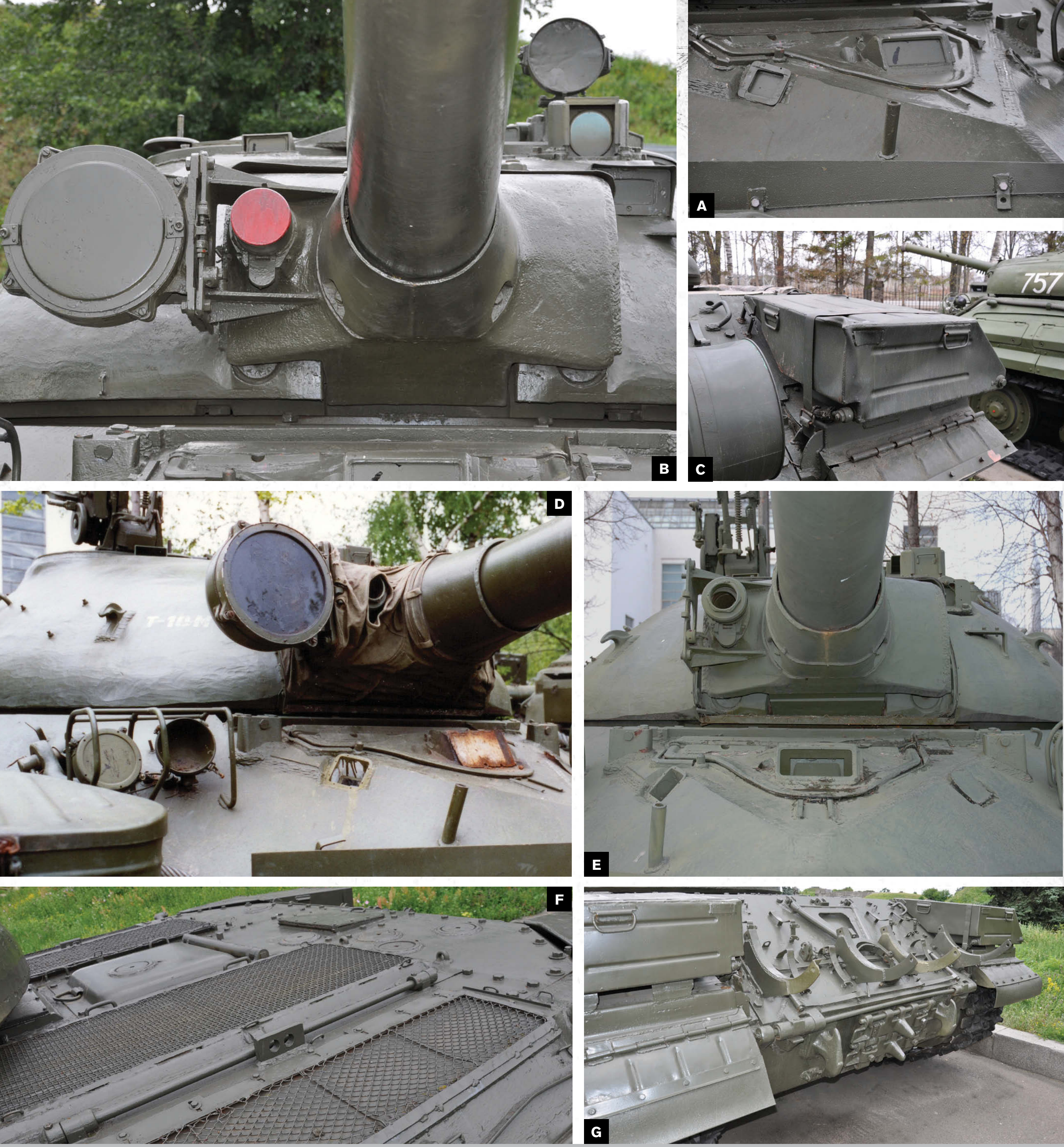








continuation from the IS-3. Without the additional splash deflector, the base shape is more apparent. **(K)** The T-10M track is wider than that of the IS-3, and the track guards are also proportionally modified.



(A) The T-10 series glacis is entirely different from the earlier IS-3 both in form and dimension. The driver-mechanic has far better direct and periphery vision. **(B)** The T-10M at the GPWMM in Kiev with the L2 infrared searchlight in place, covered by a protective plate. The 14.5mm KPVT aperture is blanked off. **(C)** The angular reserve fuel tanks are peculiar to the T-10 heavy tank, and were vulnerable to manoeuvring accidents. **(D, E)** The T-10M as it arrived at the Central Armed Forces Museum in Moscow in 1993, with the canvas gun shroud and L2 infrared main armament searchlight in place, and as it looks today with many original features removed. **(F)** The T-10M engine deck was reconfigured as compared to the earlier T-10A and T-10B, with modified access hatches and fuel filling points. The welded on protected grilles are non-original museum additions. **(G)** The rear armour plate on the T-10M is particularly crowded, with brackets for BDSh-5 smoke containers, long range fuel tanks and the gun transport lock.

Two new travel locks were provided: an internal one (gun forward) held the gun at +4° elevation and a folding one at the rear of the hull (gun rear) held it at +5°.

The basis of the tank's new fire control system was the PUOT-2S 'Udar' (strike) system, using the two-axis stabilized T2S-29 main gunner's sight. Both the sight and the gun were stabilized in vertical and horizontal axis aided by the 'Liven' twin-axis gun stabilization system, whereby firing took place when the point of aim of the sight and point of aim of the gun came into alignment. The KPV cupola mount was provided with both a VK-4 anti-aircraft collimator sight and a PU-1 optical sight for ground targets. The mounting allowed elevation from -5° to +85°.

The basic ammunition complement remained 30 rounds of 122mm ammunition as with the base model T-10, with 744 rounds of 14.5mm. The 122mm rounds were a combination of HE-FRAG, AP-C, and in 1964 cumulative HEAT and later in 1967 APFSDS with partially combustible propellant charges as used in the T-64 and later T-72/T-80 MBTs. The HEAT rounds had a muzzle velocity of 930m/s and the APFSDS rounds a corresponding 1600m/s.

The cumulative AP rounds introduced in 1964 had a muzzle velocity of 950m/s with an armour penetration of 450mm of RHA. The sub-calibre 3VBM4 APFSDS rounds introduced in 1967 had a muzzle velocity of 1,600m/s and could penetrate 320mm of vertical RHA at 2,000m.

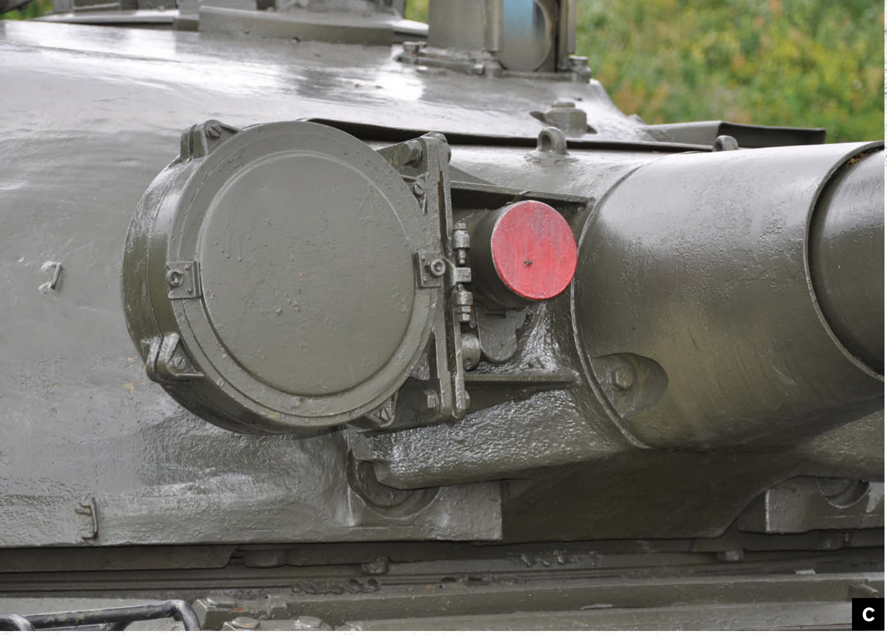
Armour protection was virtually unchanged, albeit the turret now had new apertures and mounts for the new sighting equipment.

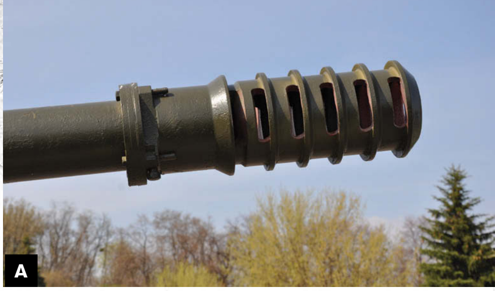
The tank used the same PPO fire fighting system until 1964, when it was upgraded to the 'Rosa-2' automated fire suppression system. Two manual OU-2 fire extinguishers were now provided.

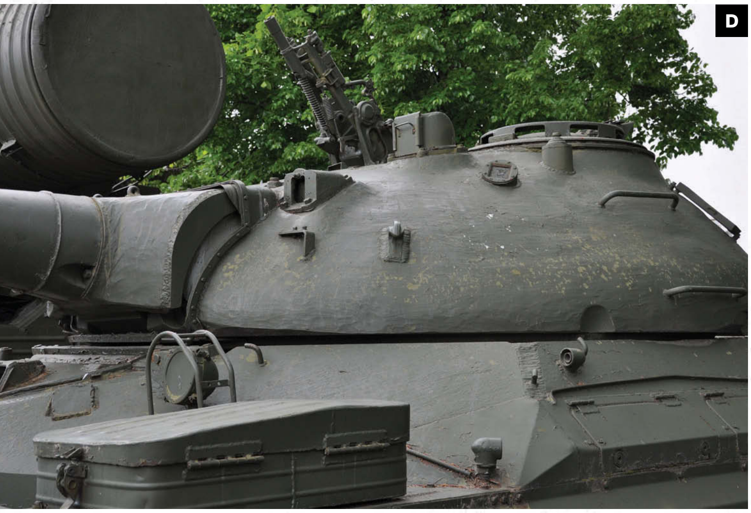
The PAZ system, introduced from 1963, provided crew protection by means of 4kg/cm^2 atmospheric overpressure within the inhabited compartments, a liner made of RZM-12 lead to protect against gamma radiation and a PKh3 NBC (chemical) detection and alarm system.

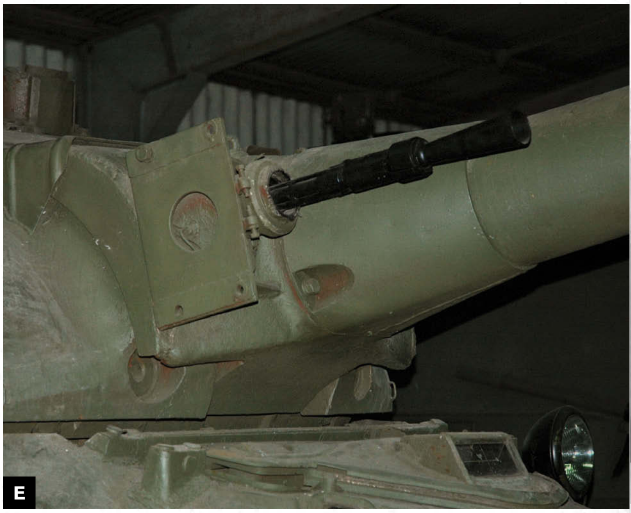
The T-10M used the improved V-12-6B engine of 750hp fitted with an improved ST-16M starter of 15hp with air starting as a back-up. There were other minor changes in the engine compartment, such as an improved air filtration system. The access hatches on the top engine deck were also reconfigured compared with the original T-10 and T-10A/B tank models.

The T-10M tank was fitted with a 6-speed gearbox, with an NSF-2 dry bath clutch and hydraulic servo control boosters. The transmission had synchromesh on speeds 3–4 and 5–6.

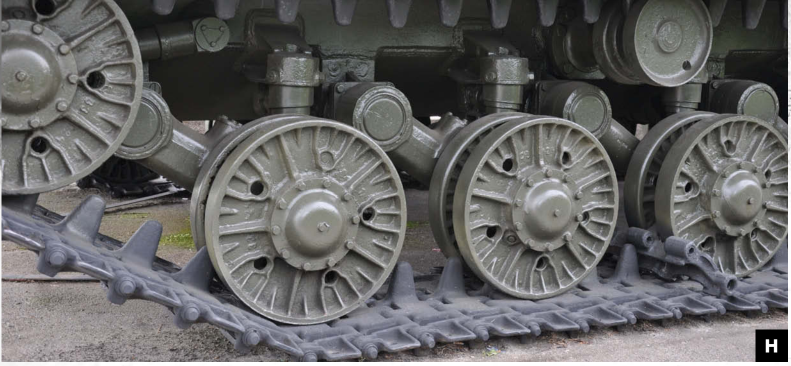


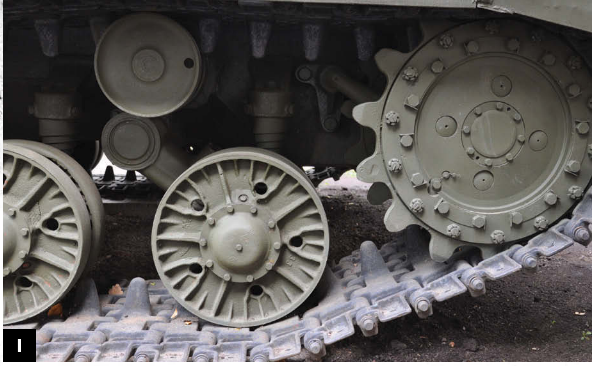


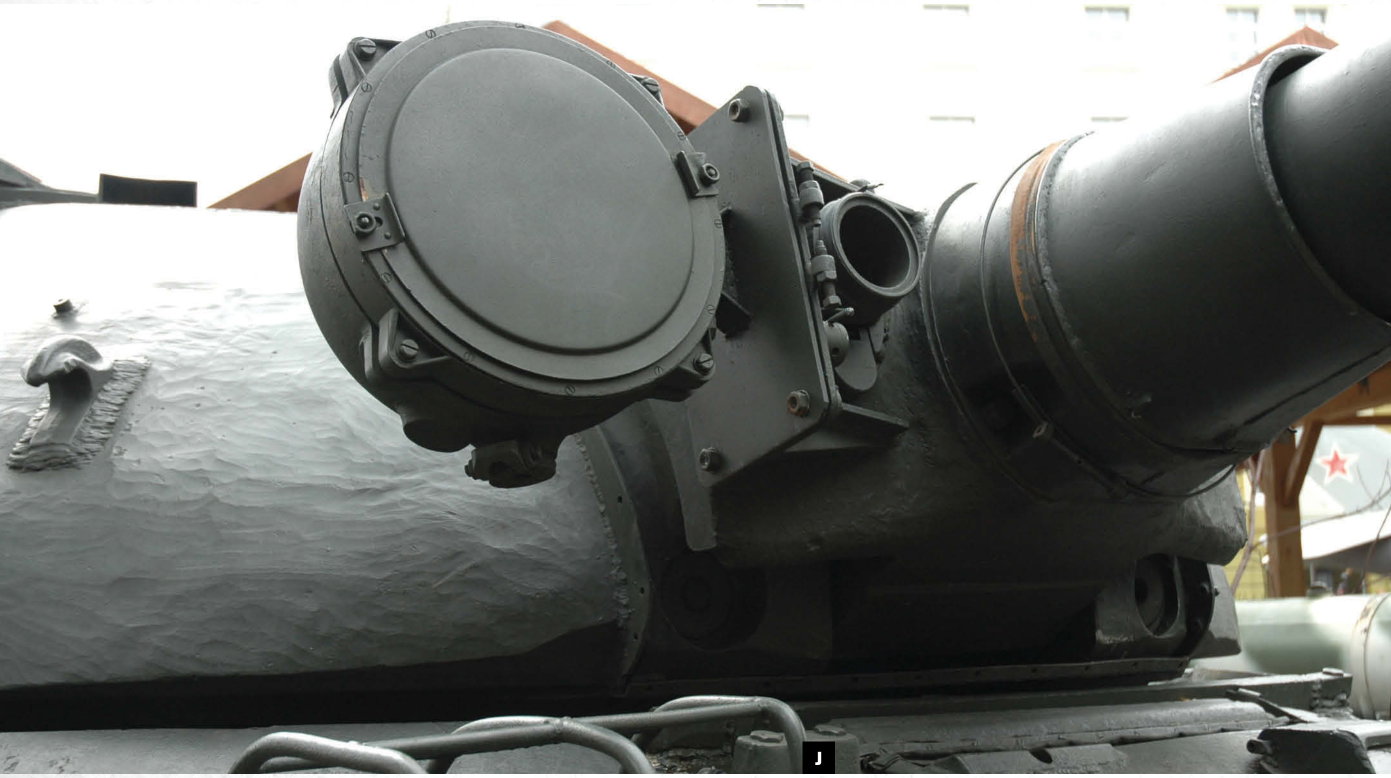


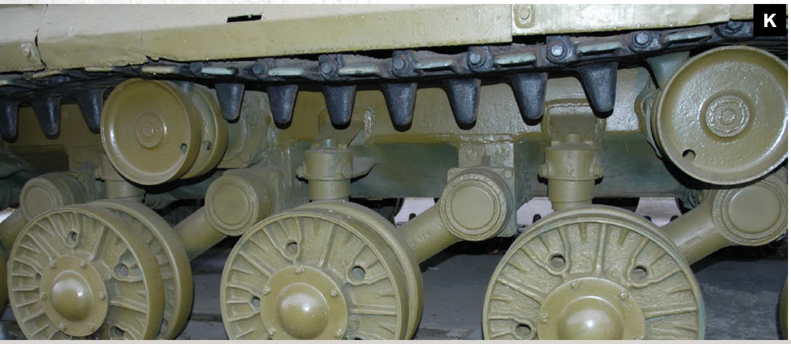


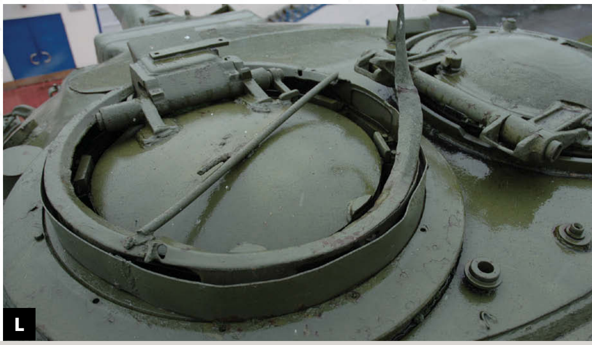
(A, B) The combination of multi-baffle muzzle brake and bore evacuator best defines the T-10M as seen from a distance. The muzzle brake is of particularly complex construction. **(C)** The L2 infrared searchlight was another defining feature of the T-10M, although some earlier T-10B tanks were also so modified. **(D)** The left side of the T-10M turret has all the gun sighting and communications ports. **(E)** The T-10M at the Kubinka Tank Museum still retains the 14.5mm KPVT co-axial armament, more specifically the barrel only. **(F, G)** From a frontal aspect the T-10M turret is flush with the turret race, but the rear has a distinct undercut. Note the rain guard diverting water away from the engine deck. **(H)** The T-10 heavy tank has a distinctly chamfered lower hull with the torsion suspension mounts and stub axle bump stops mounted at the intersection of the vertical side armour and the bevel adjoining the floor plate, an intricate fabrication arrangement. The T-10 uses the same road wheels and front idler as the earlier IS-3, but with simplified return rollers. **(I)** The drive sprockets on the T-10M are not of a unified type, reflecting production carry-over from the earlier T-10 and



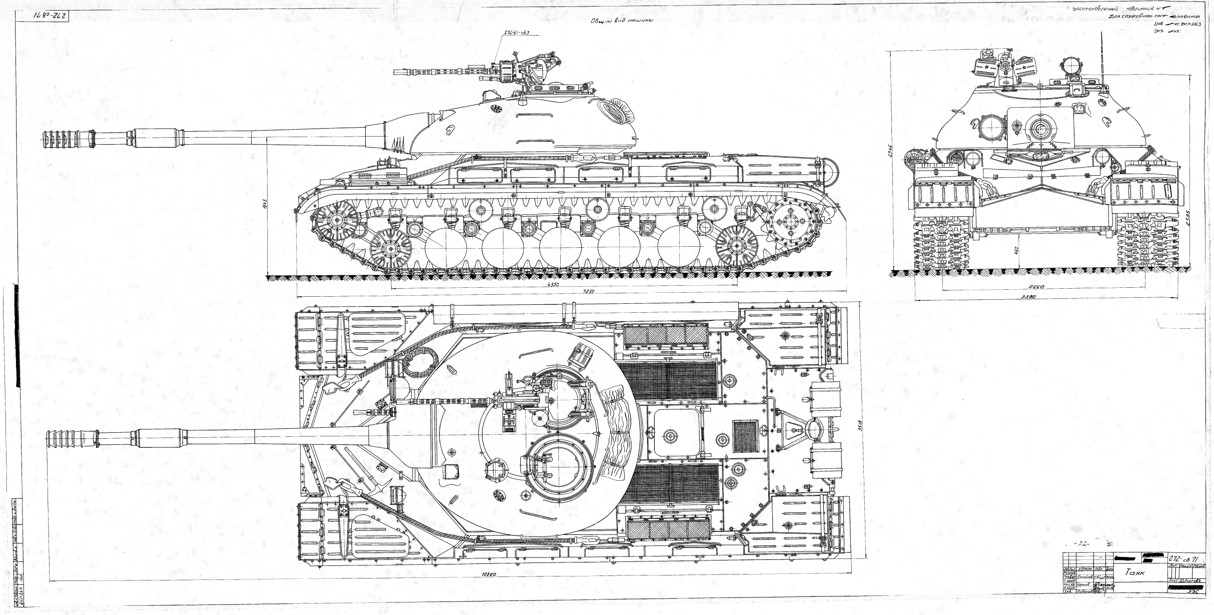








T-10M production output from the entirely separate LKZ and ChTZ plants. **(J)** The L2 infrared main armament searchlight on the T-10M located at the Muzei Tekhnika near Krasnogorsk west of Moscow. **(K)** There is limited track sag on the T-10. **(L)** The commander's and loader's hatches on the T-10M located at Izmailova Sports Stadium.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Восстановленный подлинник
Для служебного пользования
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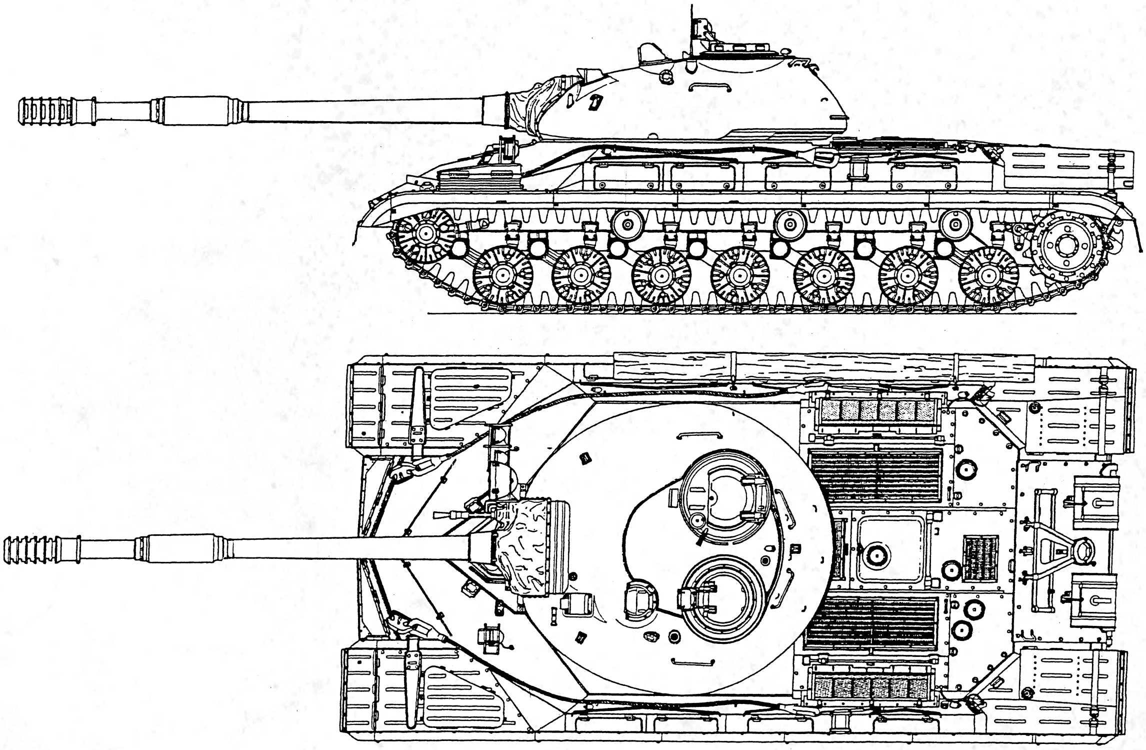
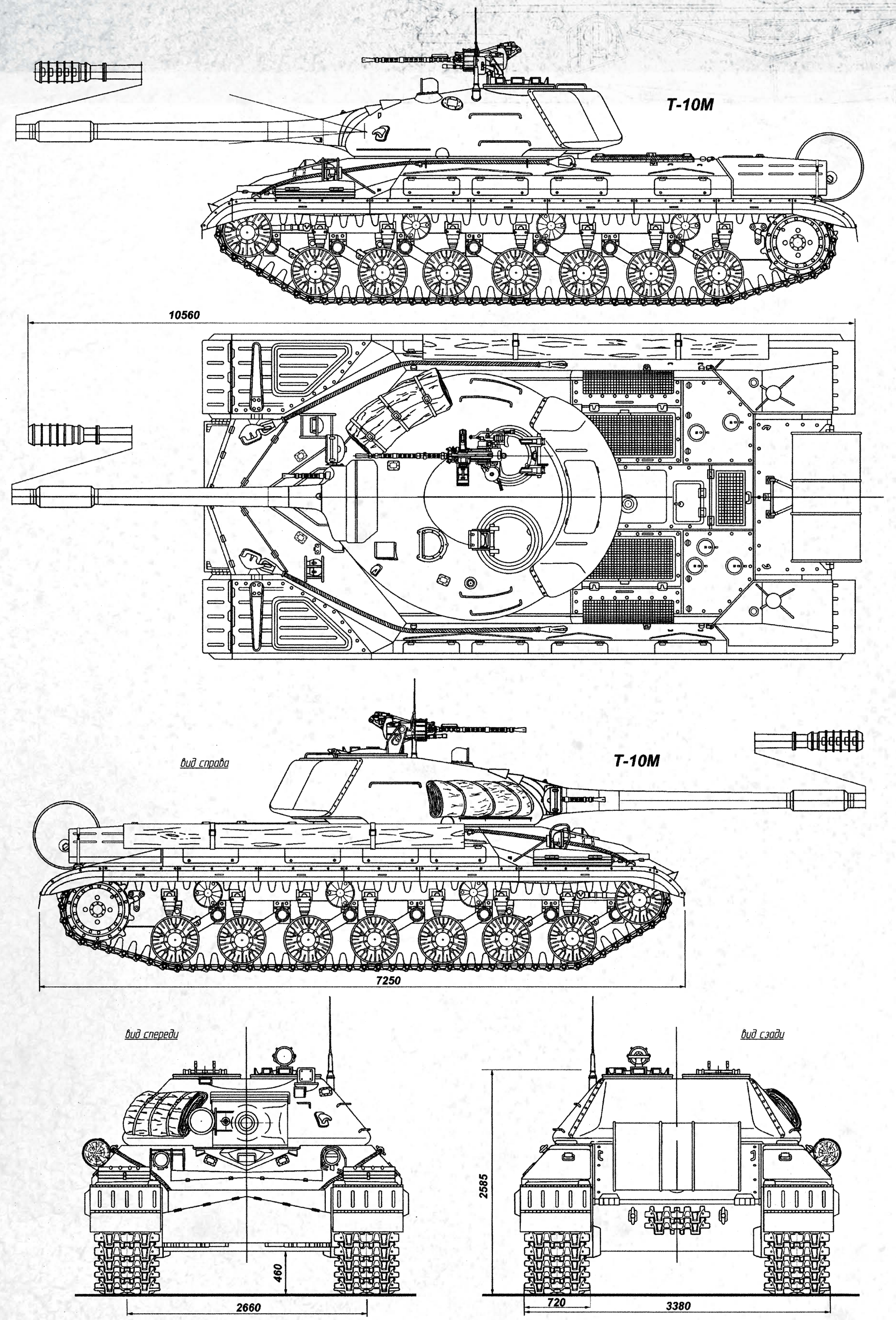
АЭС

Plant drawing of the Obiekt-272 (T-10M) heavy tank.



Side elevation and plan drawings of the T-10M (not to scale).


T-10M
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вид справа
T-10M
7250
вид спереди
вид сзади
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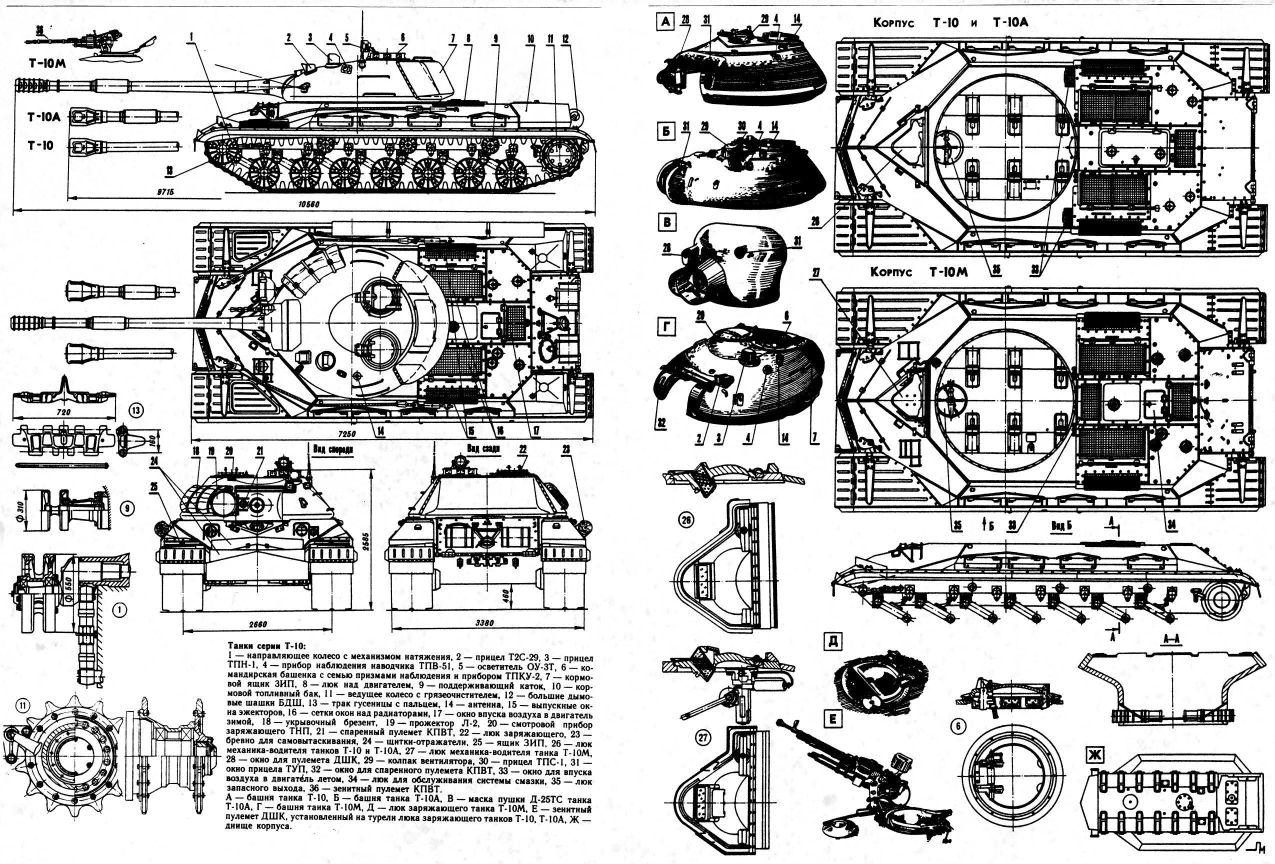
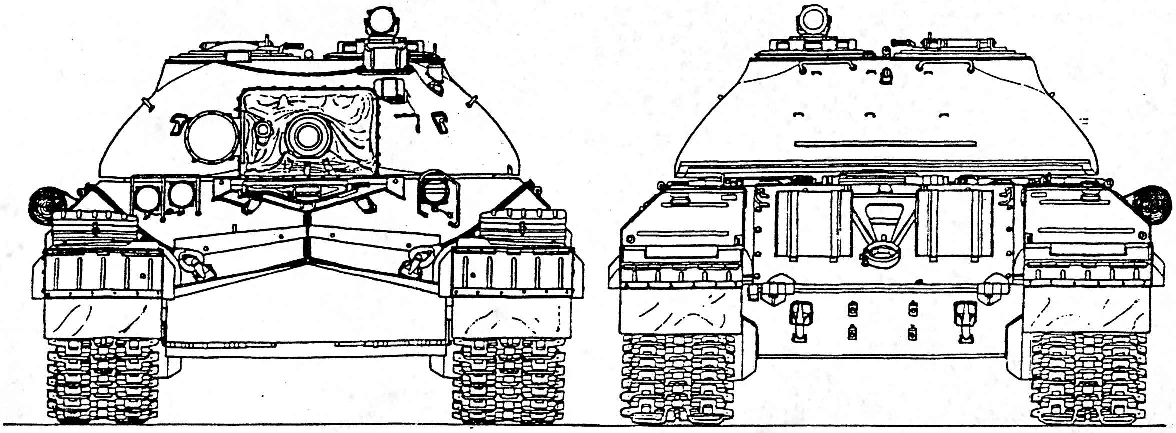
3380

Drawings of the T-10M heavy tank with rear turret bustle stowage (not to scale).

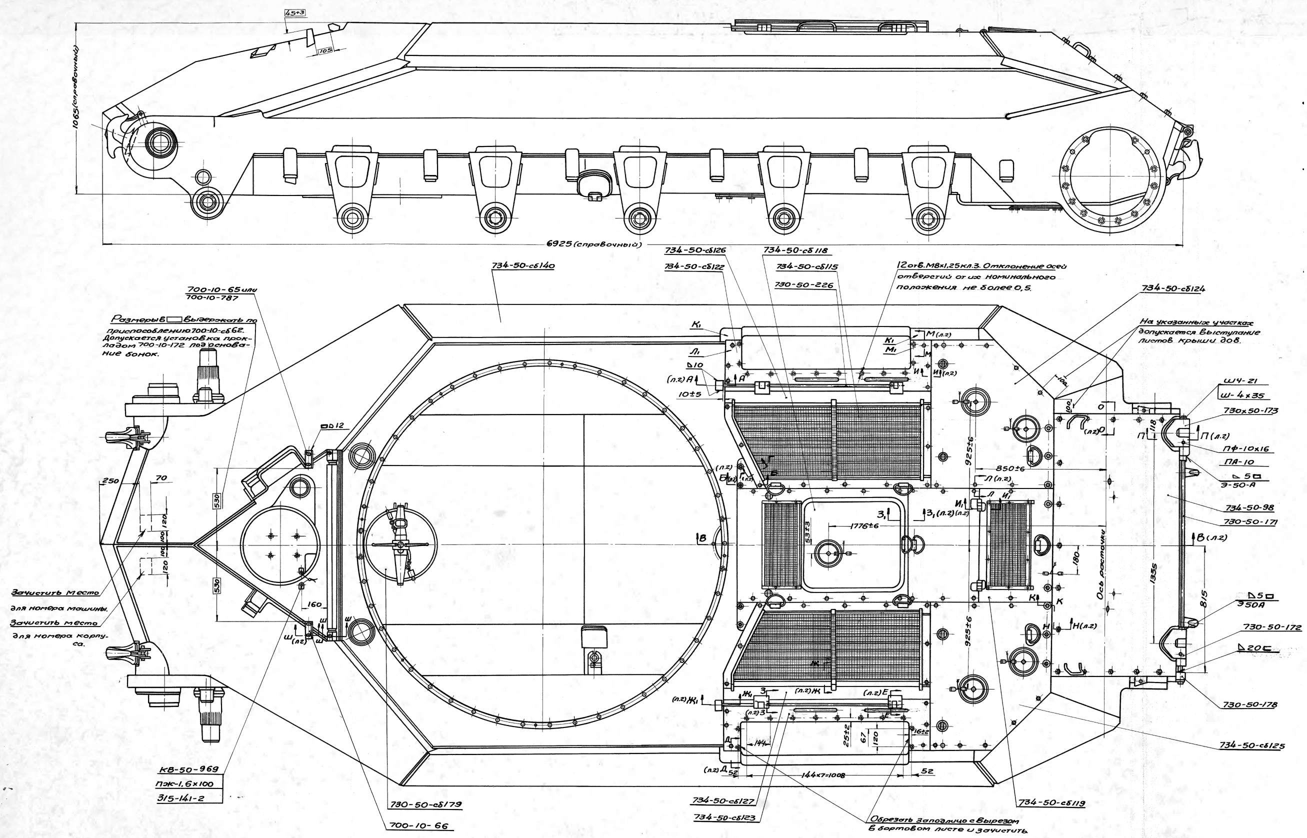


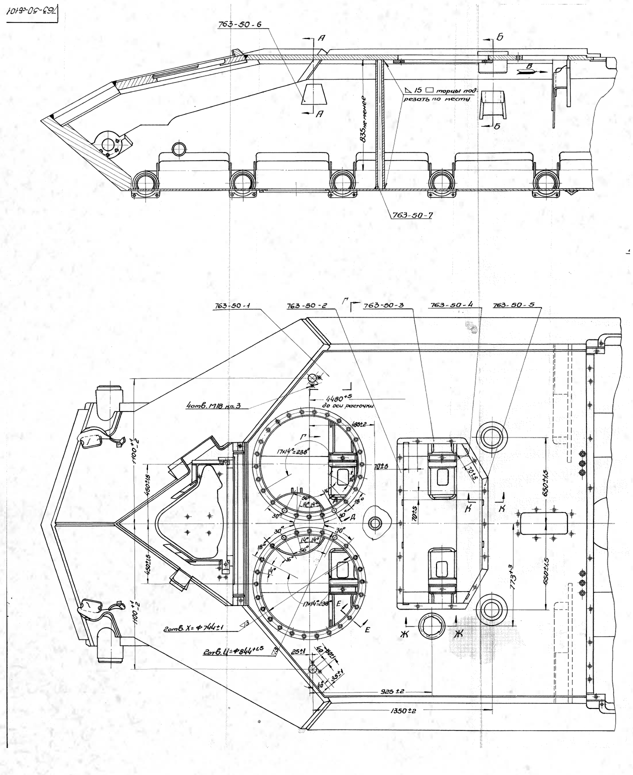
Танки серии Т-10:
1 — направляющее колесо с механизмом натяжения, 2 — прицел Т2С-29, 3 — прицел ТПН-1, 4 — прибор наблюдения наводчика ТПВ-51, 5 — осветитель ОУ-3Т, 6 — командирская башенка с семью призмами наблюдения и прибором ТПКУ-2, 7 — кормовой ящик ЗИП, 8 — люк над двигателем, 9 — поддерживающий каток, 10 — кормовой топливный бак, 11 — ведущее колесо с грязеочистителем, 12 — большие дымовые шашки БДШ, 13 — трак гусеницы с пальцем, 14 — антенна, 15 — выпускные окна эжекторов, 16 — сетки окон над радиаторами, 17 — окно впуска воздуха в двигатель зимой, 18 — укрывочный брезент, 19 — прожектор Л-2, 20 — смотровой прибор заряжающего ТНП, 21 — спаренный пулемет КПВТ, 22 — люк заряжающего, 23 — бревно для самовытаскивания, 24 — щитки-отражатели, 25 — ящик ЗИП, 26 — люк механика-водителя танков Т-10 и Т-10А, 27 — люк механика-водителя танка Т-10М, 28 — окно для пулемета ДШК, 29 — колпак вентилятора, 30 — прицел ТПС-1, 31 — окно прицела ТУП, 32 — окно для спаренного пулемета КПВТ, 33 — окно для впуска воздуха в двигатель летом, 34 — люк для обслуживания системы смазки, 35 — люк запасного выхода, 36 — зенитный пулемет КПВТ.
А — башня танка Т-10, Б — башня танка Т-10А, В — маска пушки Д-25ТС танка Т-10А, Г — башня танка Т-10М, Д — люк заряжающего танка Т-10М, Е — зенитный пулемет ДШК, установленный на турели люка заряжающего танков Т-10, Т-10А, Ж — днище корпуса.

The drawings published many years ago in the Soviet era magazine *Modelist Konstruktor* are still a useful guide to some of the myriad differences between the various T-10 heavy tank models.



Front and rear elevation drawings of the T-10M (not to scale).


45±3
105
1065 (справочный)
6925 (справочный)
734-50-сб140
734-50-сб126
734-50-сб122
734-50-сб118
734-50-сб115
730-50-226
12 отв. М8×1,25 кл.3. Отклонение осей отверстий от их номинального положения не более 0,5.
734-50-сб124
На указанных участках допускается выступание листов крыши до 8.
700-10-65 или 700-10-787
Размеры в ▭ выдержать по приспособлению 700-10-сб62. Допускается установка прокладок 700-10-172 под основание бонок.
▭D12
250
70
530
120
100
160
Зачистить место для номера машины.
Зачистить место для номера корпуса.
КВ-50-969
ПЖ-1,6×100
315-141-2
730-50-сб179
700-10-66
10±5
850±6
925±6
1776±6
Ось расточки
1335
815
ШЧ-21
Ш-4×35
730×50-173
ПФ-10×16
ПА-10
▵5▭
Э-50-А
734-50-98
730-50-171
▵5▭ Э50А
730-50-172
▵20▭
730-50-178
734-50-сб125
25±2
67
120
16±2
144
144×7=1008
52
734-50-сб127
734-50-сб123
734-50-сб119
Обрезать заподлицо с вырезом в бортовом листе и зачистить


763-50-6
763-50-7
▵15 ▭ торцы подрезать по месту
835 не менее
763-50-1
763-50-2
763-50-3
763-50-4
763-50-5
4 отв. М18 кл.3
4480+5 до оси расточки
17×14°=238°
485±2
70±5
650±1,5
1100
450±1,5
925±2
1350±2

ABOVE: The full story of the T-10 is still unfolding. Here are plant drawings for the projected Obiekt-734-50sb2, ostensibly a variant of the standard T-10M. The chassis has been shortened, however, and the number of stub axles reduced, the proposed suspension mounting altered and the drivetrain apparently entirely reconsidered.

LEFT: Another projected T-10M development, the Obiekt-763 redesign was mulled over in 1960.

In December 1962, the simplified six-stage, three-shaft and combined ZF MPP transmission developed and tested on the Obiekt-709 prototypes was introduced on the T-10M at both LKZ and ChTZ. In addition to the engineering simplification, the re-design provided a weight saving of 507kg and allowed for another approximately 100 litres of fuel to be located under armour.

With a total fuel capacity of 930 litres, the T-10M originally had a road range of approximately 250–300km. From 1963 this was increased to 1,020 litres due to the MTO re-design noted above, and this combined with the new transmission arrangement gave an increased road range of 340km. A 400 litre reserve fuel capacity was provided by means of two distinctive flat fuel tanks flush mounted at the rear of the engine deck, which increased total road range to 460km.

The running gear remained nearly the same, but the width of the road wheel rims was expanded from 144mm to 172mm to improve floatation. The OMSh tracks remained 720mm wide, with 88 links per side when new.

Starting in 1962, the T-10M was fitted with OPVT fording equipment. A special cover was fastened to the commander's cupola to mount the intake snorkel of the system.

T-10MK COMMANDER'S TANK (OBIEKT-272K)

The T-10MK was a specially modified variant for battalion and regimental commanders. Development on the basis of the T-10M was undertaken at OKBT at LKZ under the direction of Iosef Kotin from 1957, with the original plant index Obiekt-272K.

The T-10MK was fitted with the R-113 VHF FM radio and also with an R-112 HF AM radio capable of sending either voice or Morse code signals. A 10m mast was provided for communications at the halt, which gave a 40km range in telephone mode and 100km range in telegraph mode.

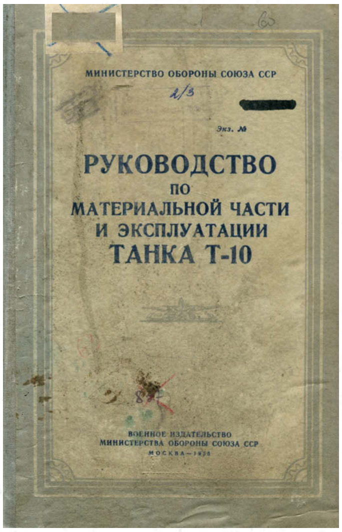
The extra communications equipment was accompanied by an AB-1-P/30 30 volt DC generator set with a two-cycle air cooled 2hp (1.5kVt) auxiliary power unit (APU). It had an 8 litre fuel tank and could operate for four hours on a single fuelling.

The tank was fitted with a TNA-2 land navigation system, including a GPK-52 gyrocompass and course sensor and a PT-200Ts electrical control system to power the device.

The ammunition complement was reduced to 22 rounds for the main armament to make space for the additional command equipment. Ammunition remained the same for the 14.5mm machine guns.

The T-10MK was produced at LKZ from 1959 to 1962 and until 1964 at ChTZ, with 100 of these command tanks being built in total.

OPERATOR MANUAL INSTRUCTIONS



МИНИСТЕРСТВО ОБОРОНЫ СОЮЗА ССР

2/3 [redacted]

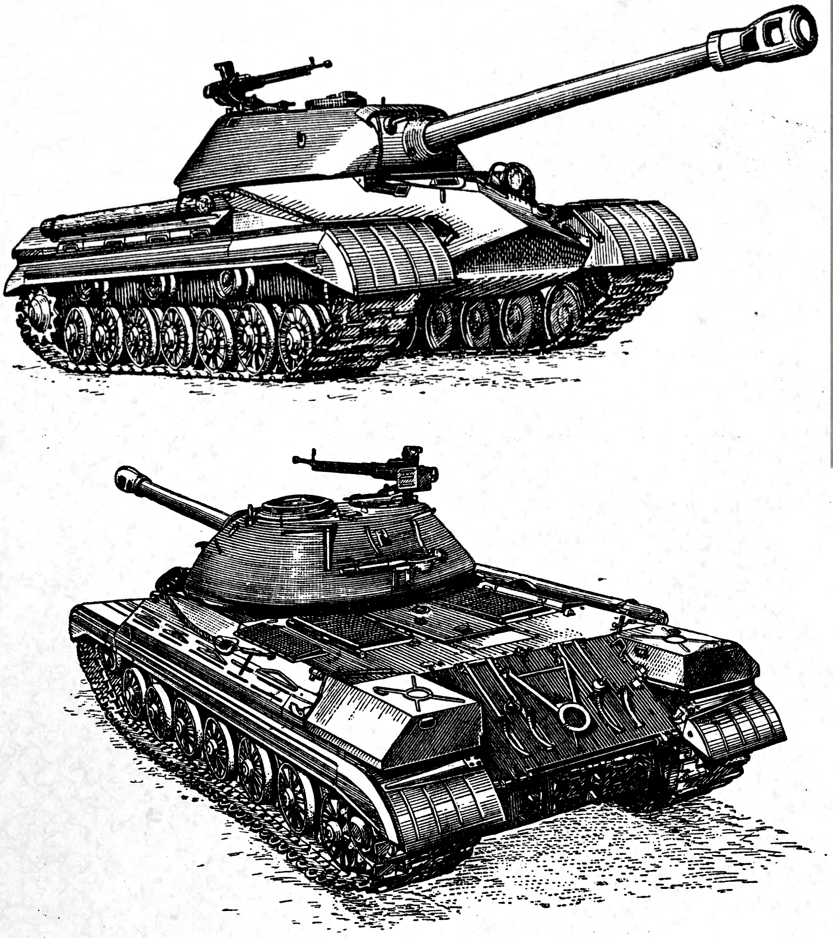
60

Экз. №

РУКОВОДСТВО
ПО
МАТЕРИАЛЬНОЙ ЧАСТИ
И ЭКСПЛУАТАЦИИ
ТАНКА Т-10

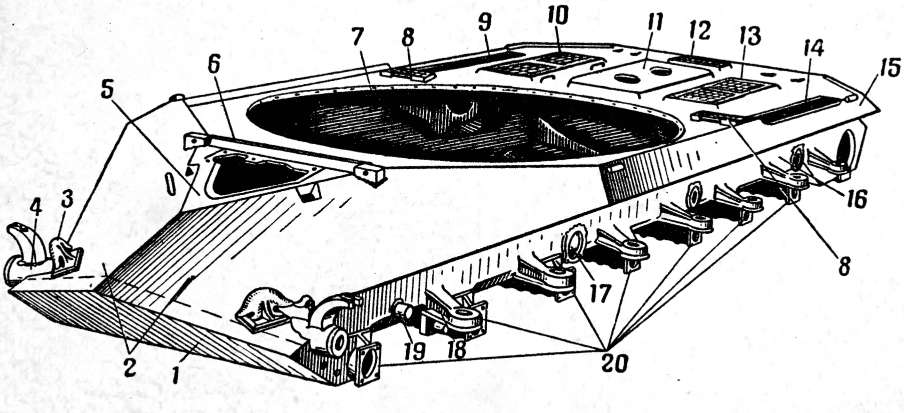
ВОЕННОЕ ИЗДАТЕЛЬСТВО
МИНИСТЕРСТВА ОБОРОНЫ СОЮЗА ССР
МОСКВА—1956

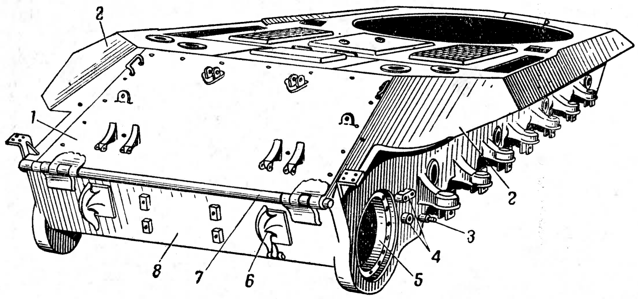
ABOVE: T-10 Operator's Manual, for early T-10 variants, dated 1956. The images from pages 89–97 are taken from here.

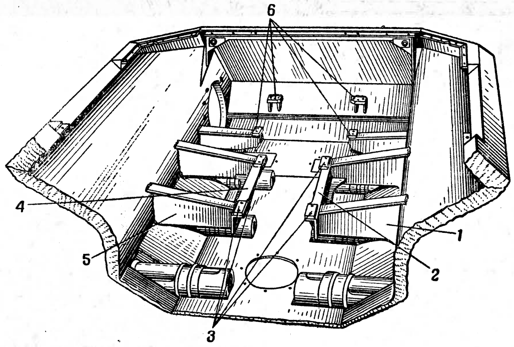


LEFT: T-10 front and rear elevations as depicted in the Operator's Manual.

BELOW: Early T-10 hull layout.





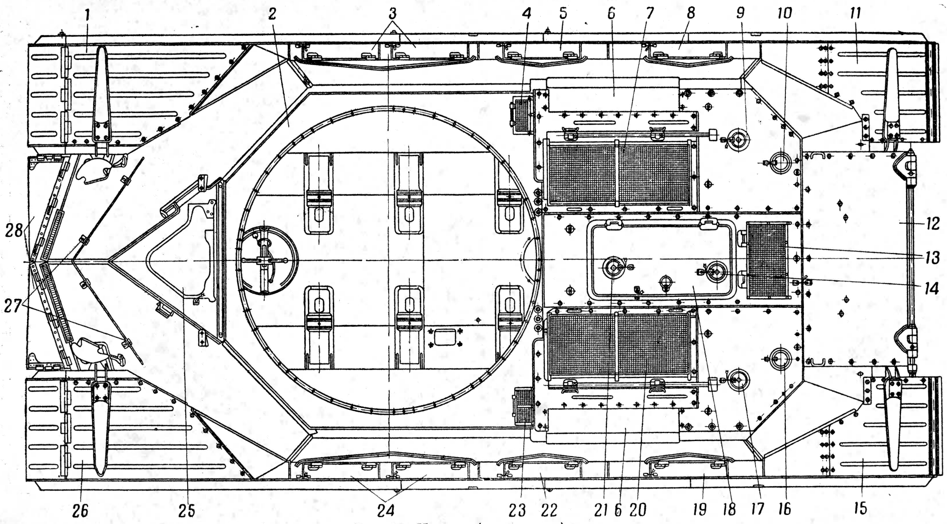


ABOVE LEFT: Early T-10 hull layout.

ABOVE RIGHT: T-10 MTO (engine and transmission) compartment.

RIGHT: Early T-10 hull – plan view.

BOTTOM: T-10 underside. The front hatch is the emergency escape hatch.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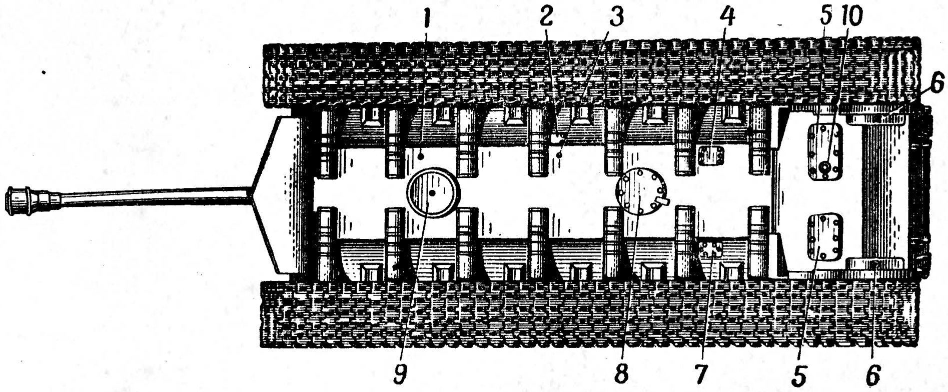
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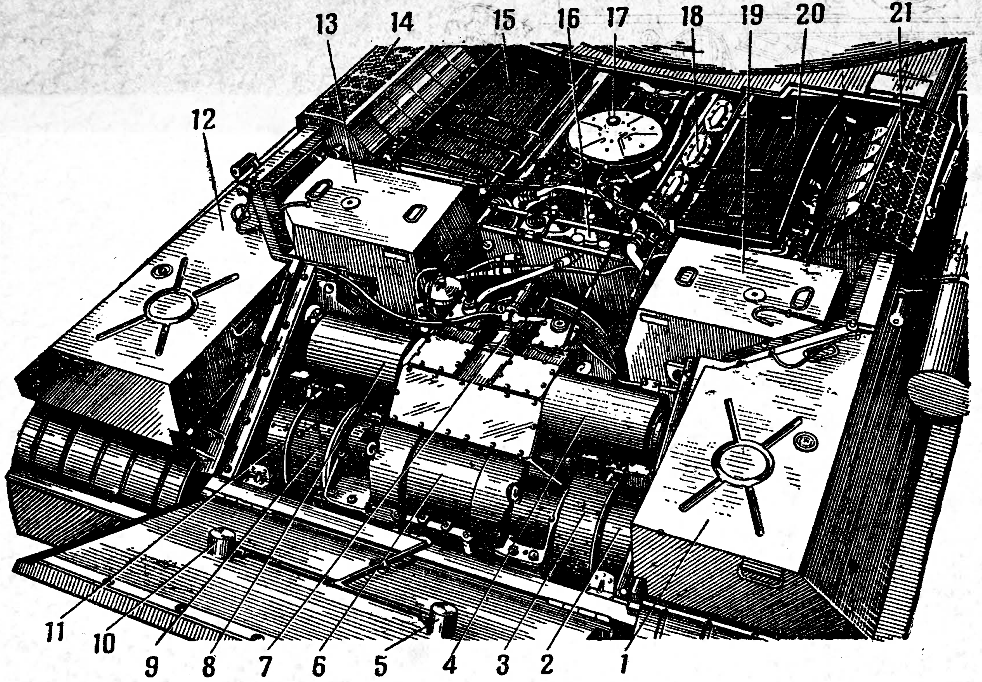
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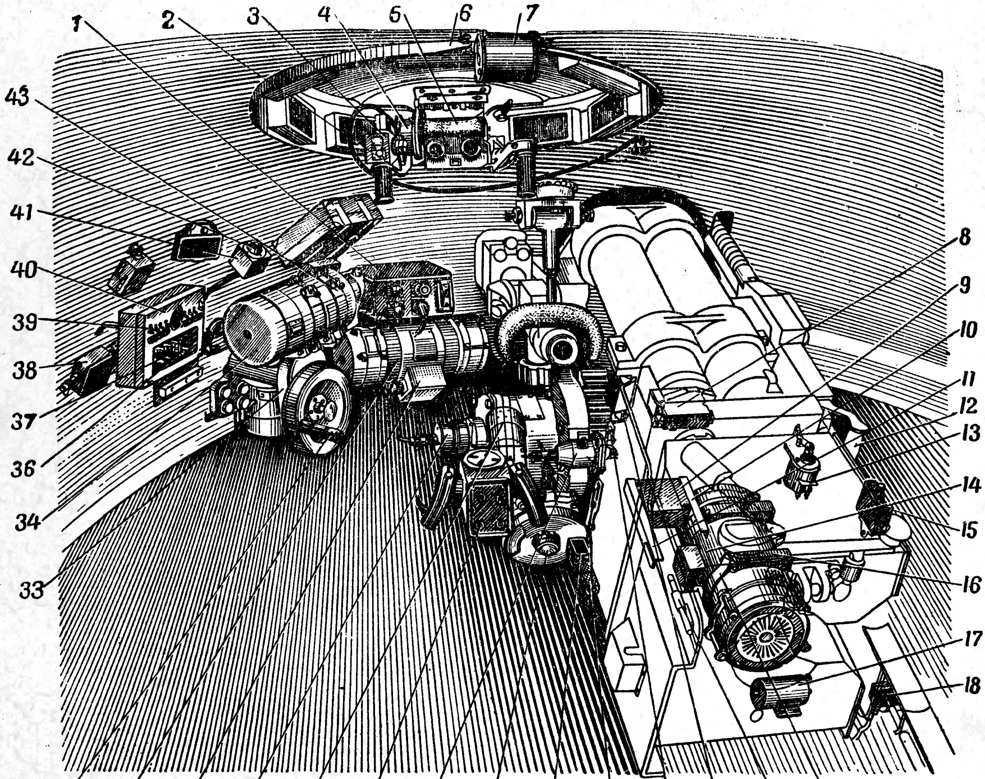
TOP: Engine, transmission and internal fuel tank arrangements.
BELOW: The early T-10 turret and fire control equipment.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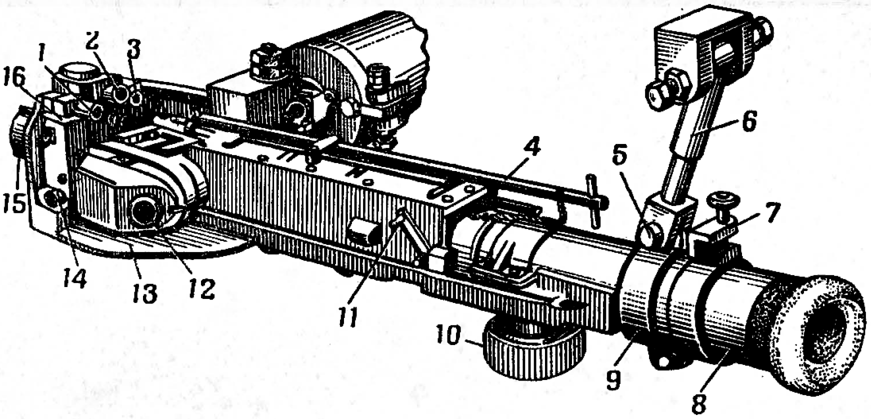
TOP: The TSh2-27 main periscope gun sight as mounted on early T-10 tanks. The TSh2-27 gun sight – the gunner's view.

BOTTOM: The TSh2-27 periscope gun sight is '6' on this manual drawing.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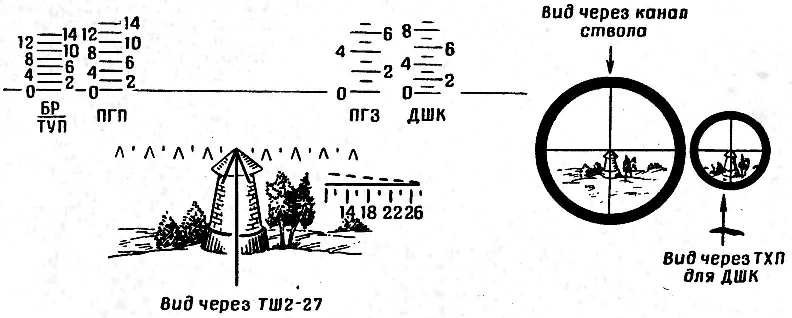
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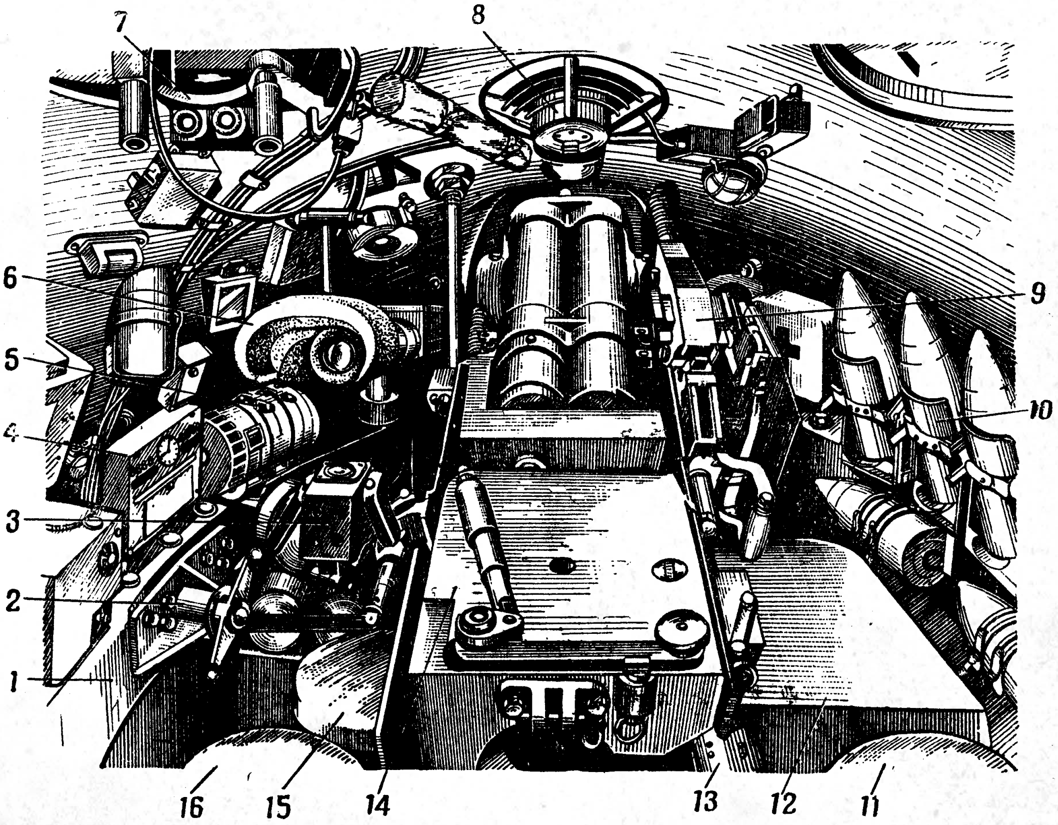
Вид через канал ствола
Вид через ТХП для ДШК
Вид через ТШ2-27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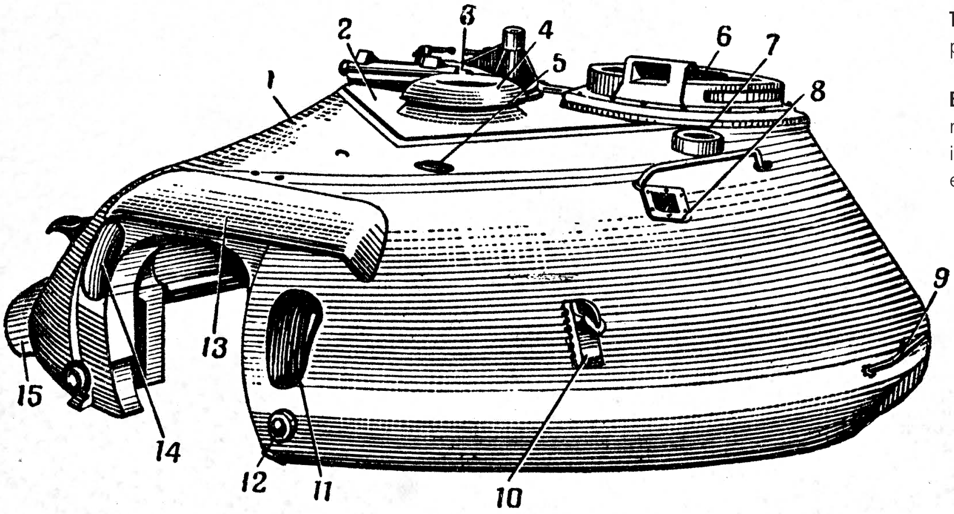
TOP: The early T-10 turret prior to T-10A/B upgrades.

BOTTOM: The driver-mechanic's position and instrument panel in the early T-10.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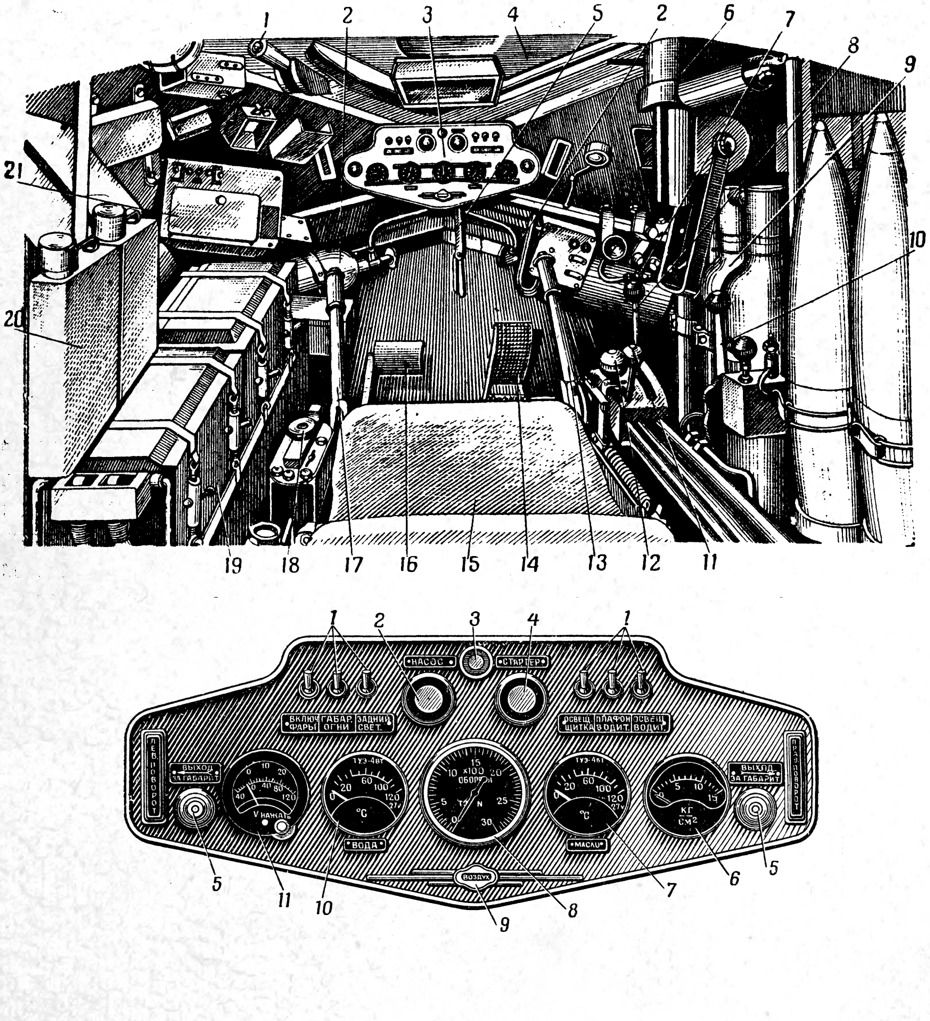
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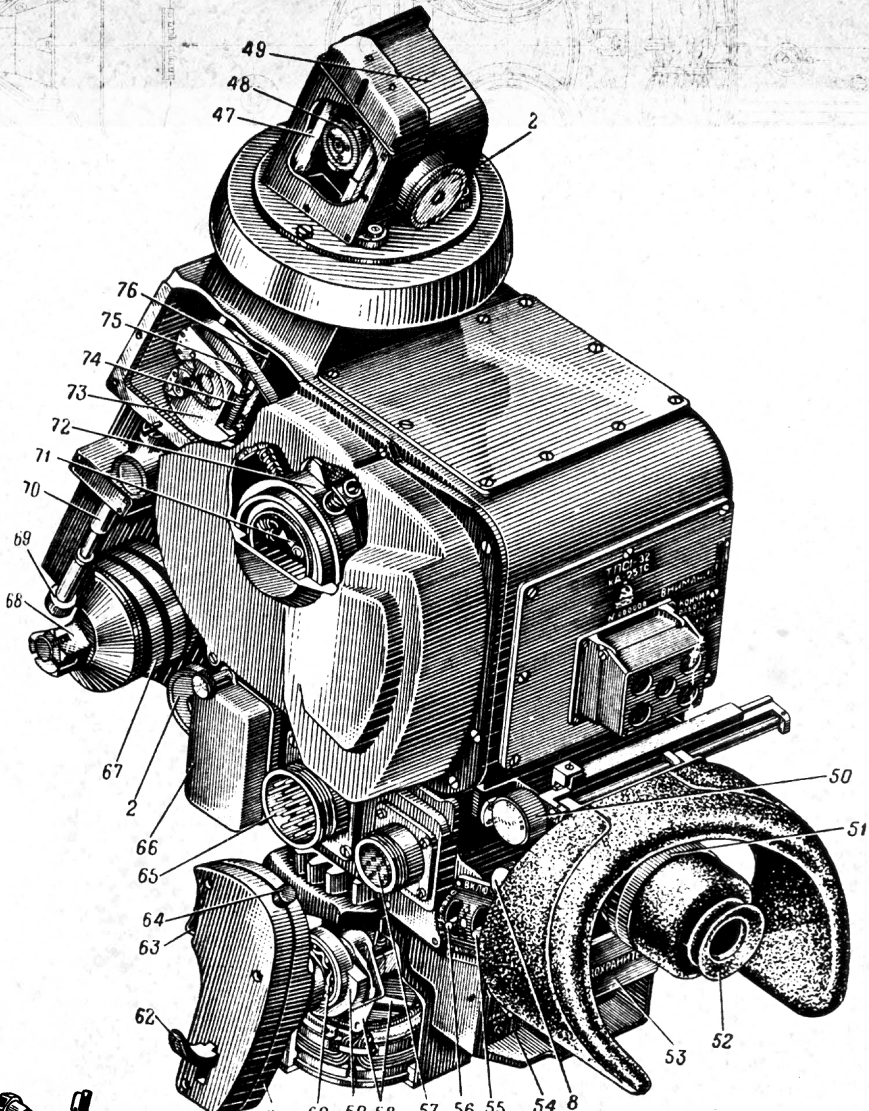
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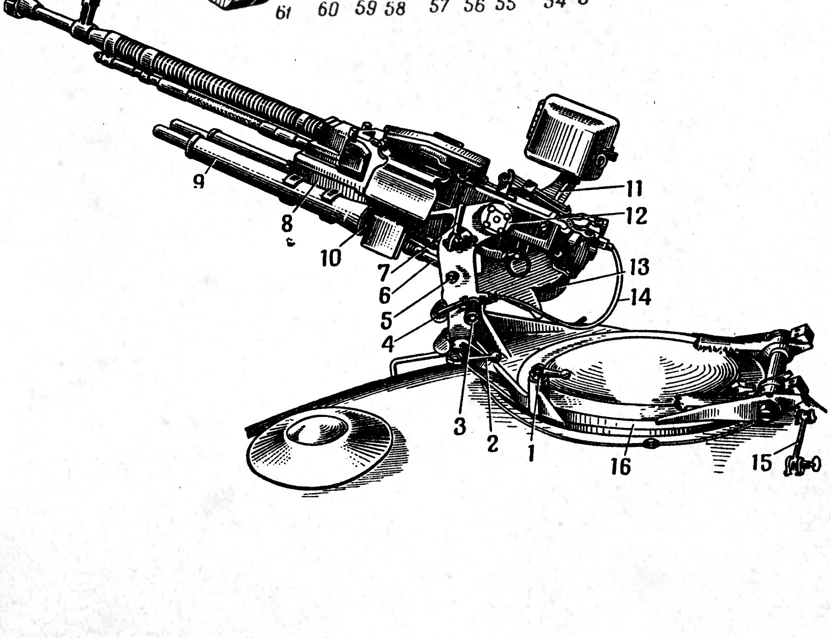
RIGHT: The TPS-1 gyroscope gun sight as mounted on the T-10A and T-10B.

BOTTOM: The 12.7mm DShKM AAMG mounted on the loader's hatch.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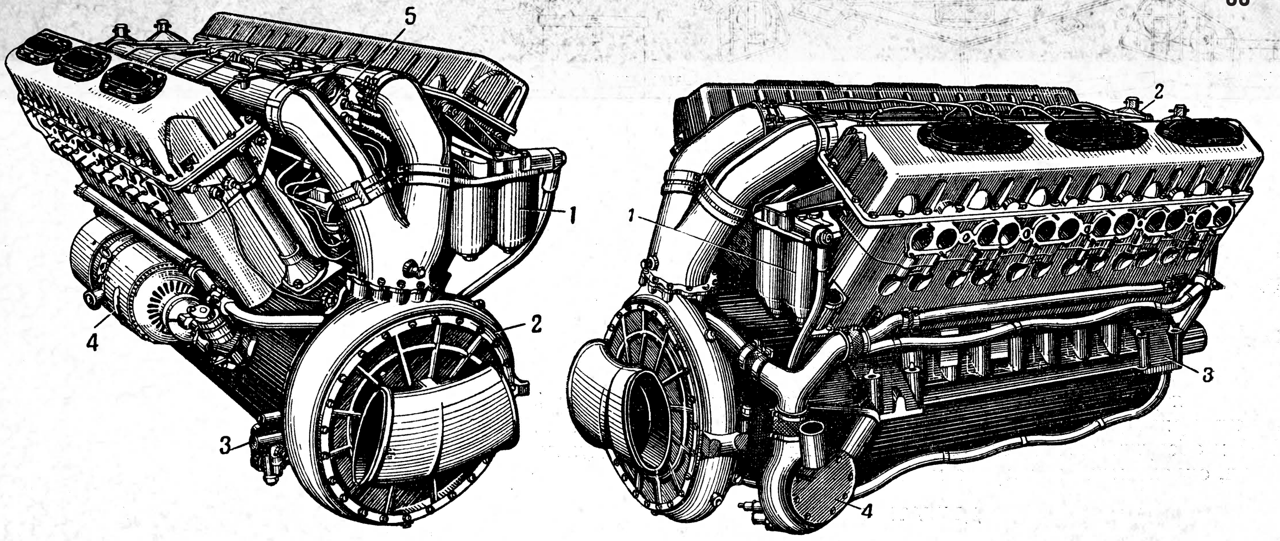

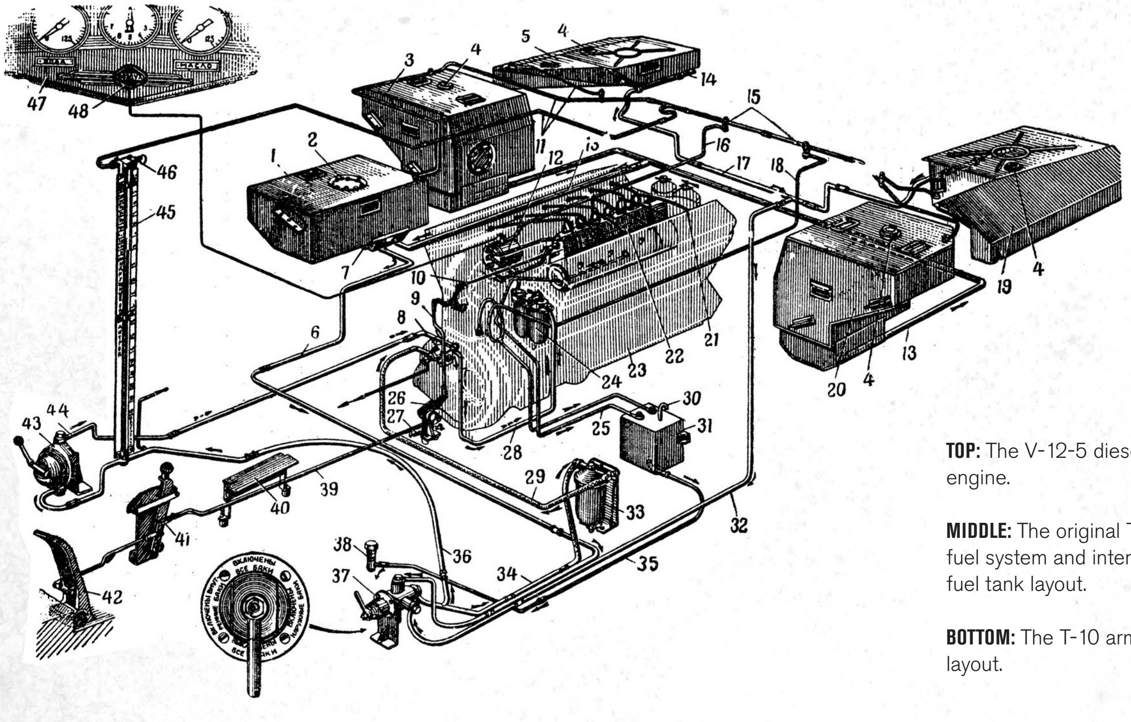
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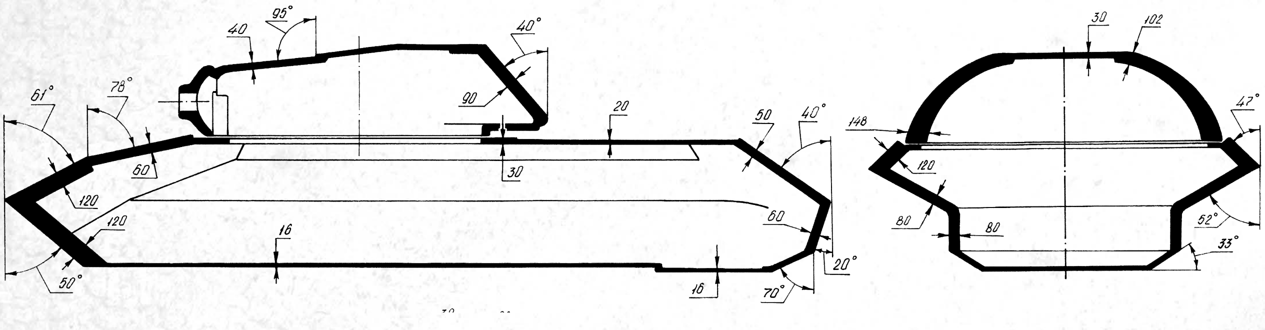
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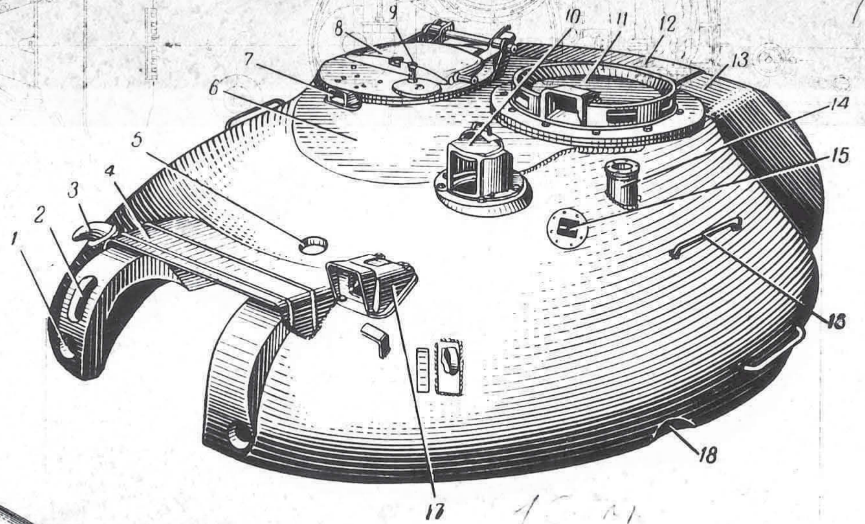
TOP: The V-12-5 diesel engine.

MIDDLE: The original T-10 fuel system and internal fuel tank layout.

BOTTOM: The T-10 armour layout.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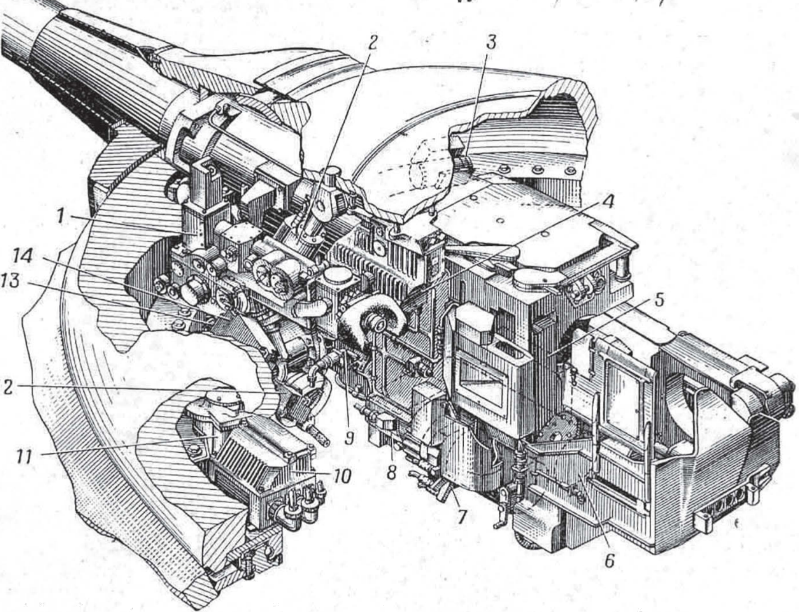
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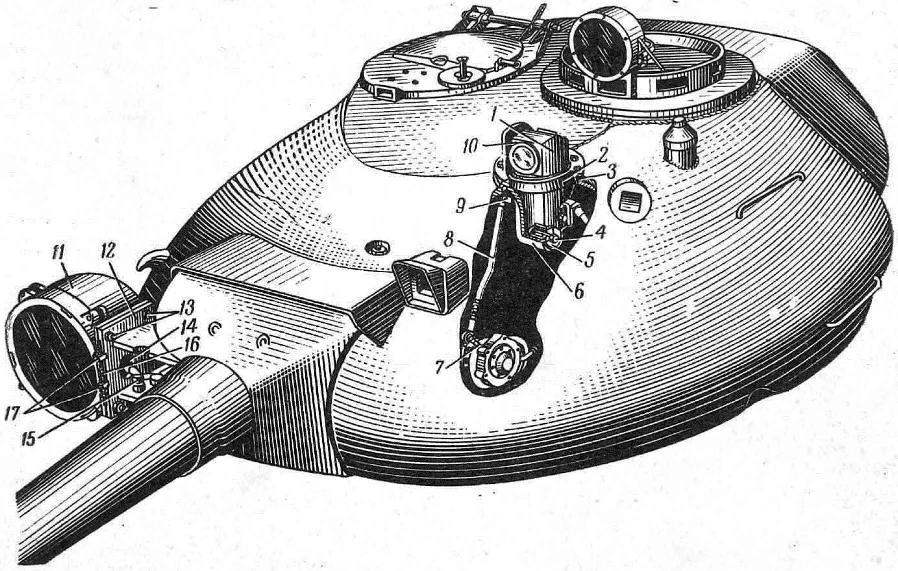
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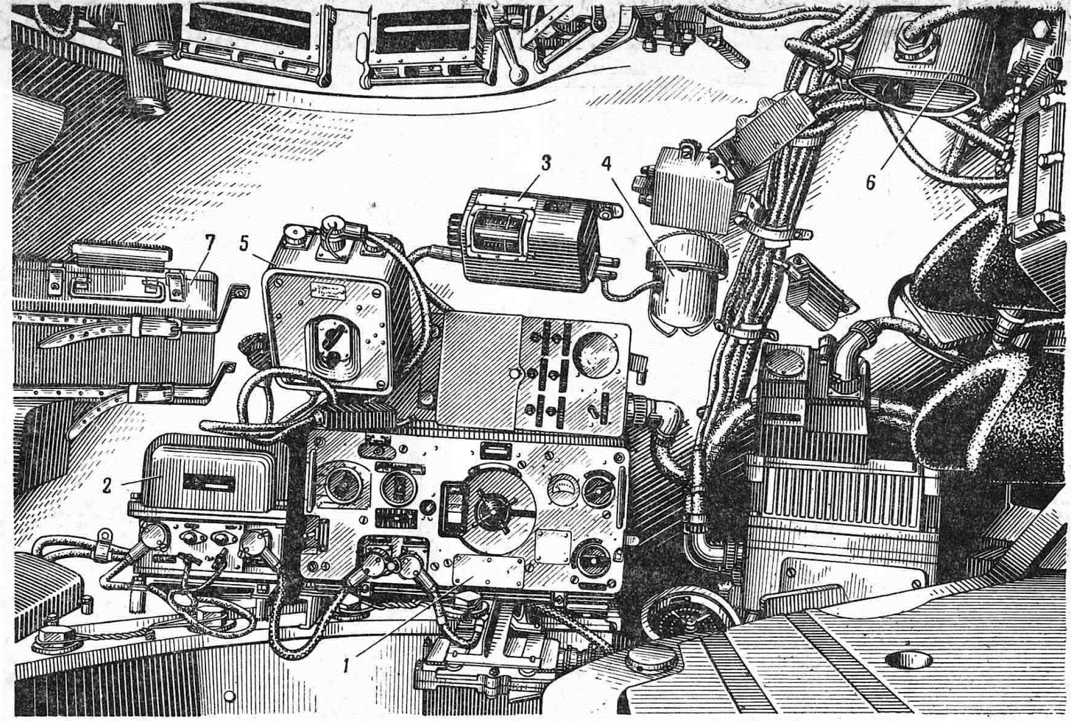
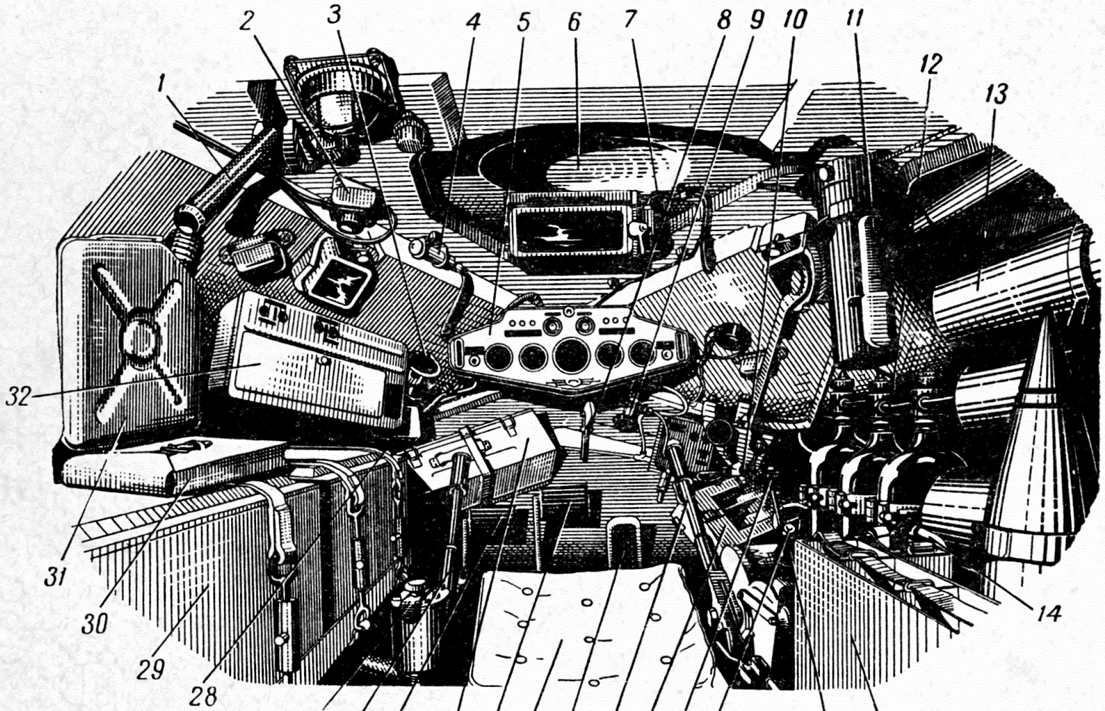
TOP: The T-10M turret with TPN-1 gyroscopic gun sight.

MIDDLE: Internal cutaway of the T-10M turret and its 122mm M-62-T2 armament.

BOTTOM: T-10M TPN-1 sight and L2 infrared searchlight.



ABOVE: The radio communications system mounted within the turret.
BELOW: The driver-mechanic's compartment on the T-10M.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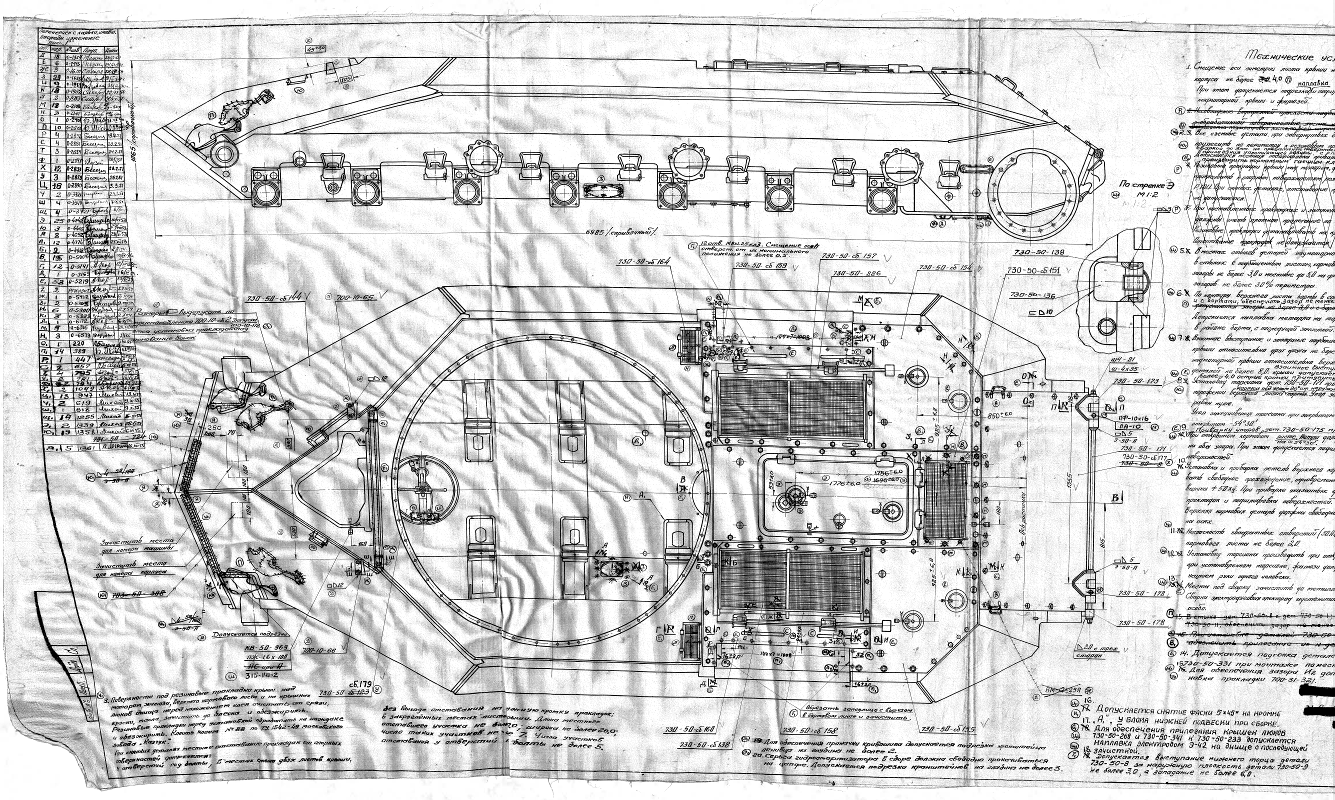
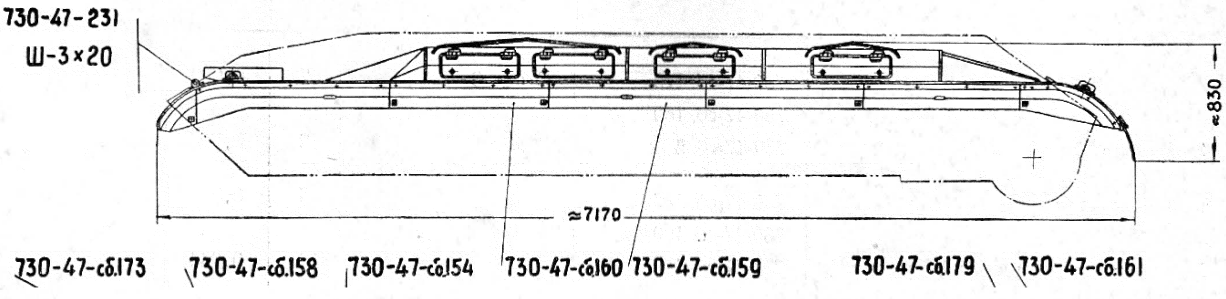
ORIGINAL PLANT DRAWINGS



ABOVE: Obiekt-730 (T-10) side and plan elevations – hull, dated 1950. (LKZ plant drawing)


730-47-231
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730-47-сб.159
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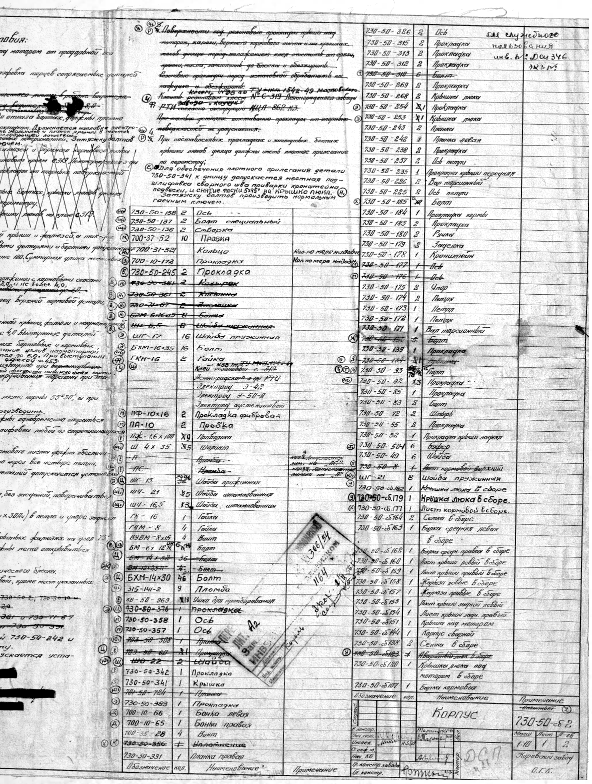
730-47-сб.161

ABOVE: Obiekt-730 (T-10) side elevation – track guards and above track storage. (LKZ plant drawing)



3. ~~Поверхности под резиновые прокладки крыши над мотором, жалюзи, верхнего кормового листа и на крышках люков днища перед наложением клея очистить от грязи, краски, масла, зачистить до блеска и обезжирить. Резиновые прокладки перед установкой обработать на наждаке и обезжирить.~~ ~~Клеить резиновым клеем № С-319 Ленинградского завода РТИ согласно инструкции ИЦА-862 КЗ.~~ клеем № 88 по ~~ТУ МХП 1542-49~~ ~~Московского~~ завода „Каучук" ~~При снятых деталях отставание прокладок от опорных поверхностей не допускается.~~

4. При поставленных прокладках и затянутых болтах крышки люков днища должны иметь плотное прилегание по периметру;

Для обеспечения плотного прилегания детали 730-50-341 к днищу допускается местная подшлифовка сварного шва приварки кронштейна подвески, и снятие фаски 5х45° на крышке люка. Затяжку болтов производить нормальным гаечным ключем.

Обозначение	кол.	Наименование	Примечание
730-50-138	2	Ось	
730-50-137	2	Болт специальный	
730-50-136	2	Створка	
700-37-52	10	Пробка	
700-31-321		Кольца	Кол. по мере надобн.
700-10-172		Прокладка	Кол. по мере надобн.
730-50-245	2	Прокладка	
~~730-50-361~~	~~2~~	~~Козырек~~	
~~730-50-361~~	~~2~~	~~Косынка~~	
~~730-71-67~~	~~2~~	~~Заглушка~~	
~~БГМ-6×16×15~~	~~8~~	~~Болт~~	
~~ШГ-6,5~~	~~8~~	~~Шайба пружинная~~	
ШГ-17	16	Шайба пружинная	
БХМ-16×35	16	Болт	
ГКН-16	2	Гайка	
		Клей ~~резиновый~~ № 88 по ~~ТУ МХП 1542-49~~ ~~с 319~~	
		~~Ленинградского з-да РТИ~~	
		Электрод Э-42	
		Электрод Э-50-А	
		Электрод аустенитовый	
ПФ-10×16	2	Прокладка фибровая	
ПА-10	2	Пробка	
ПЖ-1,6×100	X9	Проволока	
Ш-4×35	X5	Шплинт	
~~Л~~		~~Пломба~~	~~кол. 9 Х. Допускается зам. на „АС"~~
~~АС~~		~~Пломба~~	~~кол. 9 Х. Допускается замена на „Л"~~
ШГ-15	24 46 ~~36~~	Шайба пружинная	
ШЧ-21	X5	Шайба штампованная	
ШЧ-16,5	X3	Шайба штампованная	
ГК-16	1	Гайка	
ГЧМ-8	4	Гайка	
ВУВМ-8×15	4	Винт	
БМ-6×12 ОК	6 ~~X~~	Болт	
~~БМ-14×32~~	~~36~~	~~Болт~~	
~~БМ-12×25П~~	~~4~~	~~Болт~~	
БХМ-14×30	46 21	Болт	
315-141-2	9	Пломба	
КВ-50-969	X18	Ушко для пломбирования	
~~730-50-376~~	~~1~~	~~Прокладка~~	
730-50-358	1	Ось	
730-50-357	1	Ось	
~~703-50-308~~	~~1~~	~~Планка~~	
~~703-50-60~~	~~21~~	~~Прокладка~~	
~~ШО-22~~	~~2~~	~~Шайба~~	
730-50-342	1	Прокладка	
730-50-341	1	Крышка	
~~701-50-724~~	~~1~~	~~Планка~~	
730-50-383	1	Прокладка	
700-10-66	1	Банка левая	
700-10-65	1	Банка правая	
700-35-28	4	Винт	
~~730-50-356~~	~~1~~	~~Уплотнение~~	
730-50-331	1	Планка правая	
Обозначение	кол.	Наименование	Примечание

306/54 1164 A2

Обозначение	кол.	Наименование	Примечание
730-50-326	2	Ось	для служебного
730-50-315	2	Прокладка	пользования
730-50-313	2	Прокладка	инв. №: ДСч 346
730-50-312	2	Прокладка	экз №:
~~730-50-310~~	~~6~~	~~Болт~~	
730-50-269	2	Прокладка	
730-50-268	2	Крышка люка	
730-50-254	~~2~~ 1	Прокладка	
730-50-253	~~2~~ 1	Крышка люка	
730-50-243	2	Планка	
730-50-242	1	Планка левая	
730-50-238	2	Прокладка	
730-50-237	2	Ось петли	
730-50-235	1	Прокладка крыши передняя	
730-50-226	2	Вал торсионный	
730-50-225	2	Ось петли	
730-50-185	15 ~~12~~	Болт	
730-50-184	1	Прокладка кормы	
730-50-183	2	Прокладка	
730-50-180	2	Ручка	
730-50-179	2	Заделка	
730-50-178	1	Кронштейн	
~~730-50-177~~	~~1~~	~~Ось~~	
~~730-50-176~~	~~1~~	~~Ось~~	
730-50-175	2	Упор	
730-50-174	2	Петля	
730-50-173	1	Петля	
730-50-172	1	Петля	
730-50-171	1	Вал торсионный	
~~730-50-156~~	~~5~~	~~Болт~~	
730-50-139	1	Прокладка	
~~730-50-134~~	~~21~~	~~Крышка~~	
730-50-93	78	Болт	
730-50-92	X3	Прокладка	
730-50-85	1	Прокладка	
730-50-83	2	Болт	
730-50-72	2	Штырь	
730-50-55	2	Прокладка	
730-50-52	1	Прокладка крыши задняя	
730-50-50-1	6	Буфер	
730-50-49	6	Шайба	
~~730-50-8~~	~~1~~	~~Лист кормовой верхний~~	
ШГ-21	8	Шайба пружинная	
730-50-сб.182	1	Крышка люка в сборе	
730-50-сб.179	1	Крышка люка в сборе.	
730-50-сб.177	1	Лист кормовой в сборе.	
730-50-сб.164	2	Сетка в сборе	
730-50-сб.163	1	Балка средняя левая в сборе	
730-50-сб.162	1	Балка средн. правая в сборе	
730-50-сб.160	1	Лист крыши левый в сборе	
730-50-сб.159	1	Лист крыши правый в сборе	
730-50-сб.158	1	Жалюзи левые в сборе	
730-50-сб.157	1	Жалюзи правые в сборе	
730-50-сб.155	1	Лист крыши задний левый	
730-50-сб.154	1	Лист крыши задн. правый	
730-50-сб.151	1	Крыша над мотором	
730-50-сб.144	1	Корпус сварной	
730-50-сб.138	2	Сетка в сборе	
~~730-50-сб.123~~	~~1~~	~~Аварийный люк в сборе~~	
730-50-сб.120	1	Крышка люка над мотором в сборе	
730-50-сб.107	1	Балка кормовая	
Обозначение	кол.	Наименование	Примечание

Корпус

730-50-сб.2

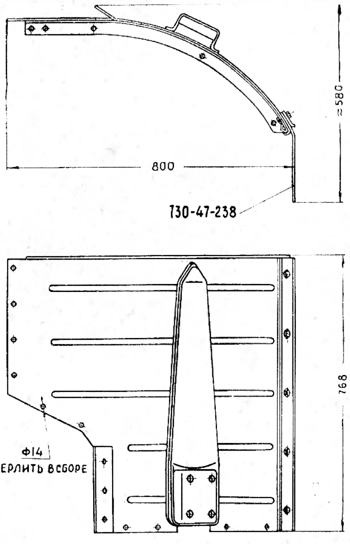
Масш.	Лист	Л-ов
1:10	1	2

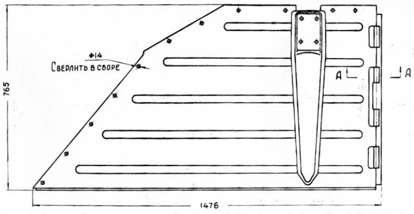
Кировский завод

О.Г.К.

Б. констр.
Нач. групп.
Инспек.
Г. инж. м.
Нач. КБ
Гл. констр. завода
Гл. констр.

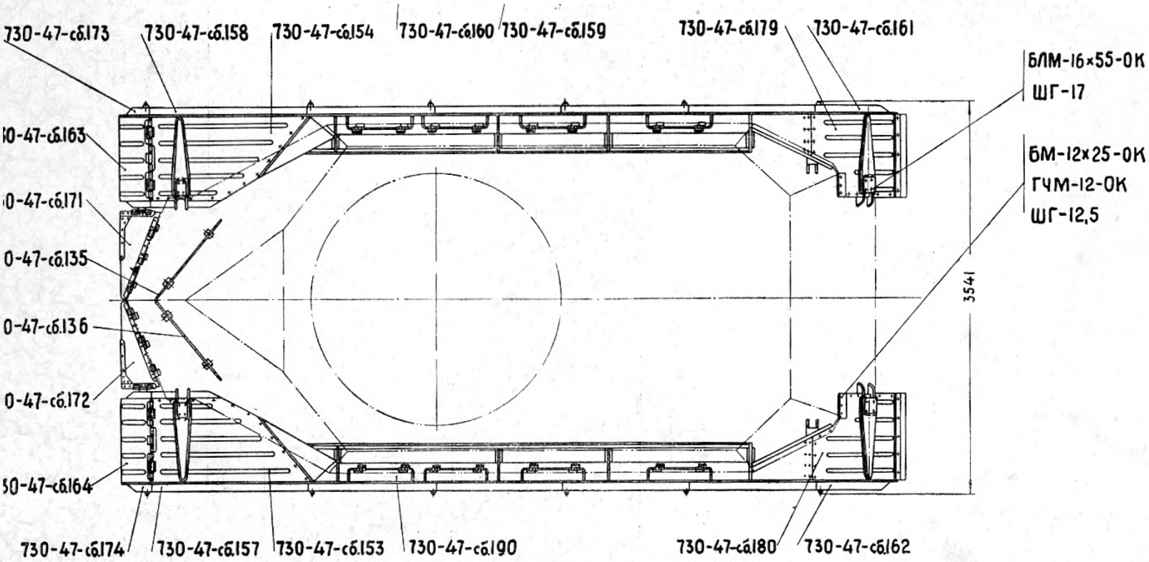
ДСП



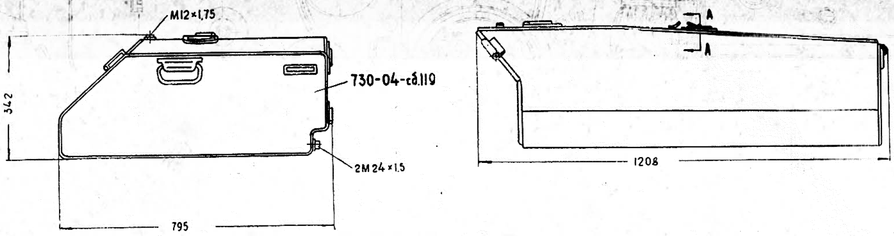


TOP LEFT: Obiekt-730 (T-10) – front track guards. (LKZ plant drawing)

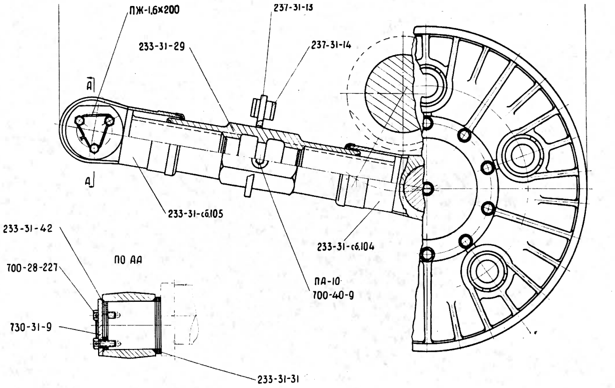
MIDDLE: Obiekt-730 (T-10) – rear track guards. (LKZ plant drawing)

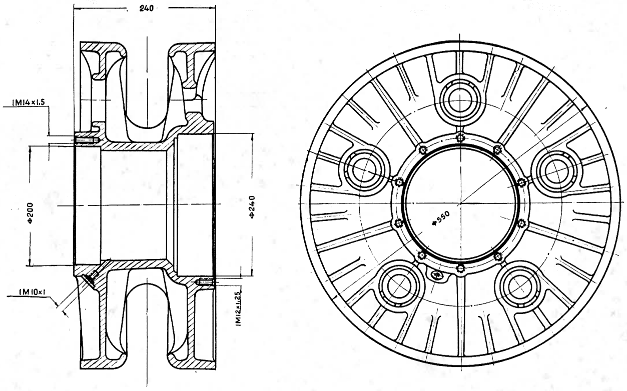


ABOVE: Obiekt-730 (T-10) plan elevation – track guards and above track storage. (LKZ plant drawing)

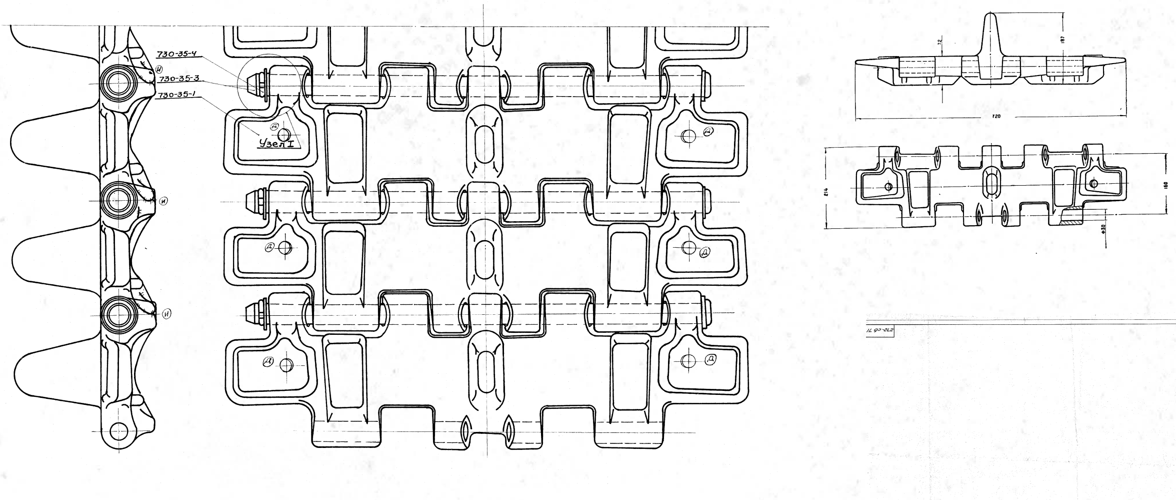

M12×1,75
730-04-сб.119
342
2M 24×1.5
795
A
A
1208

RIGHT: Obiekt-730 (T-10) – external fuel tanks. (LKZ plant drawing)

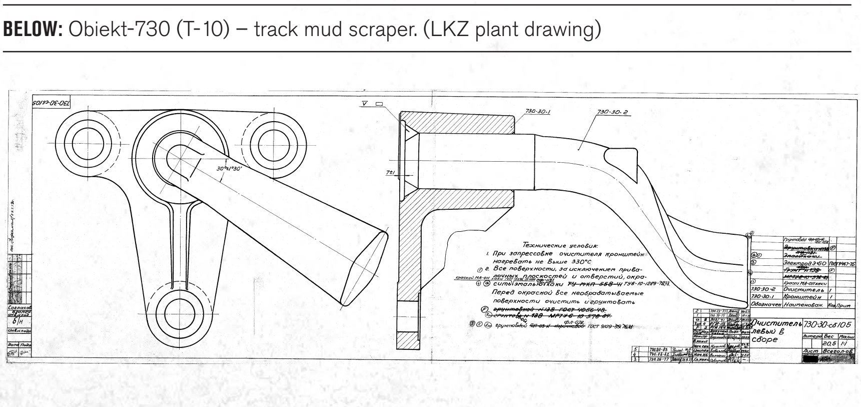

ПЖ-1,6×200
237-31-13
233-31-29
237-31-14
A
A
233-31-сб.105
233-31-42
ПО АА
700-28-227
233-31-сб.104
ПА-10
700-40-9
730-31-9
233-31-31

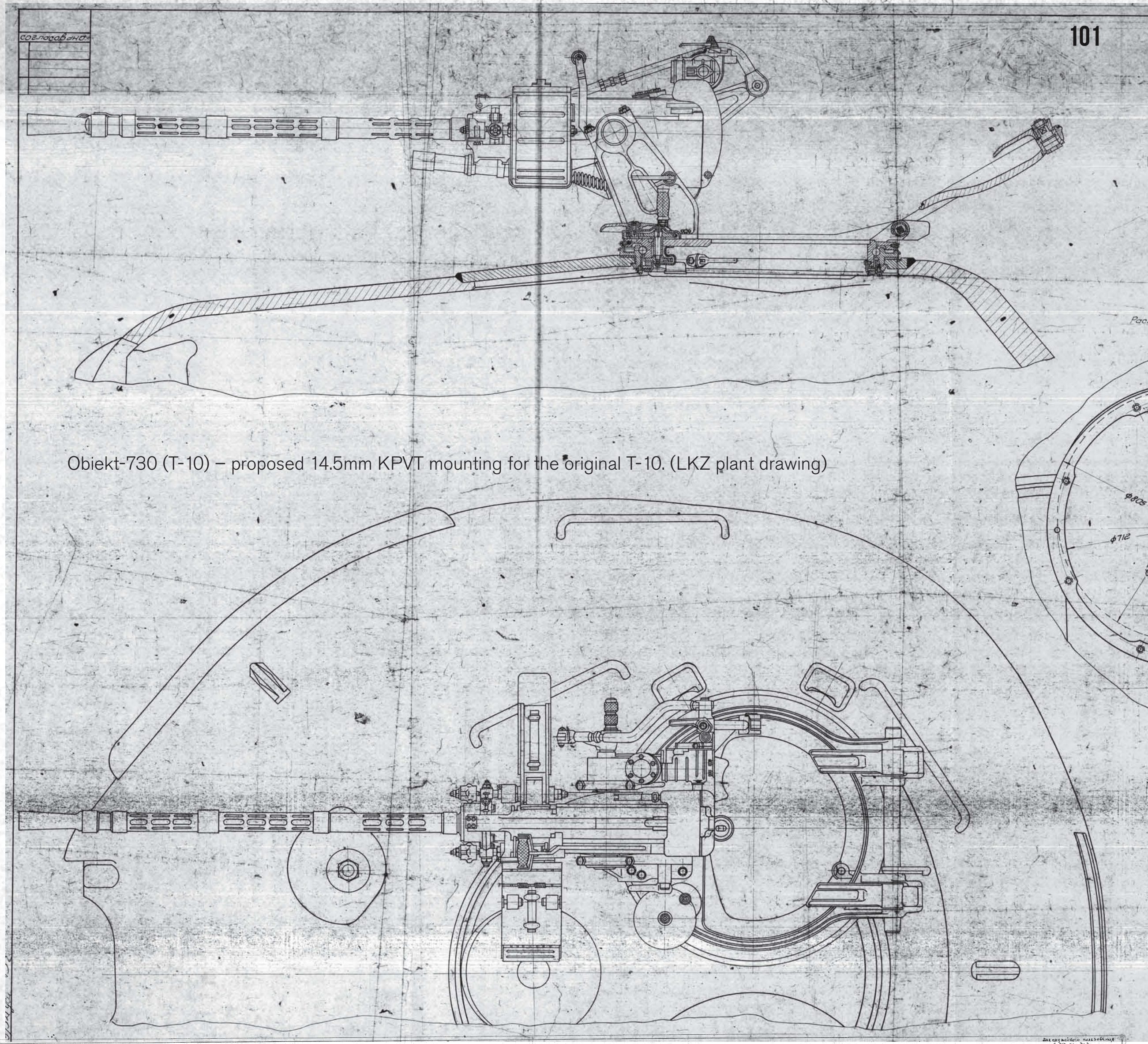

240
IM14×1.5
Ф200
Ф240
IM10×1
IM12×1.25
Ф550

ABOVE LEFT: Obiekt-730 (T-10) – stub axle suspension arm and road wheel. (LKZ plant drawing)
ABOVE RIGHT: Obiekt-730 (T-10) – road wheel. (LKZ plant drawing)
BELOW: Obiekt-730 (T-10) – track shoes. (LKZ plant drawing)

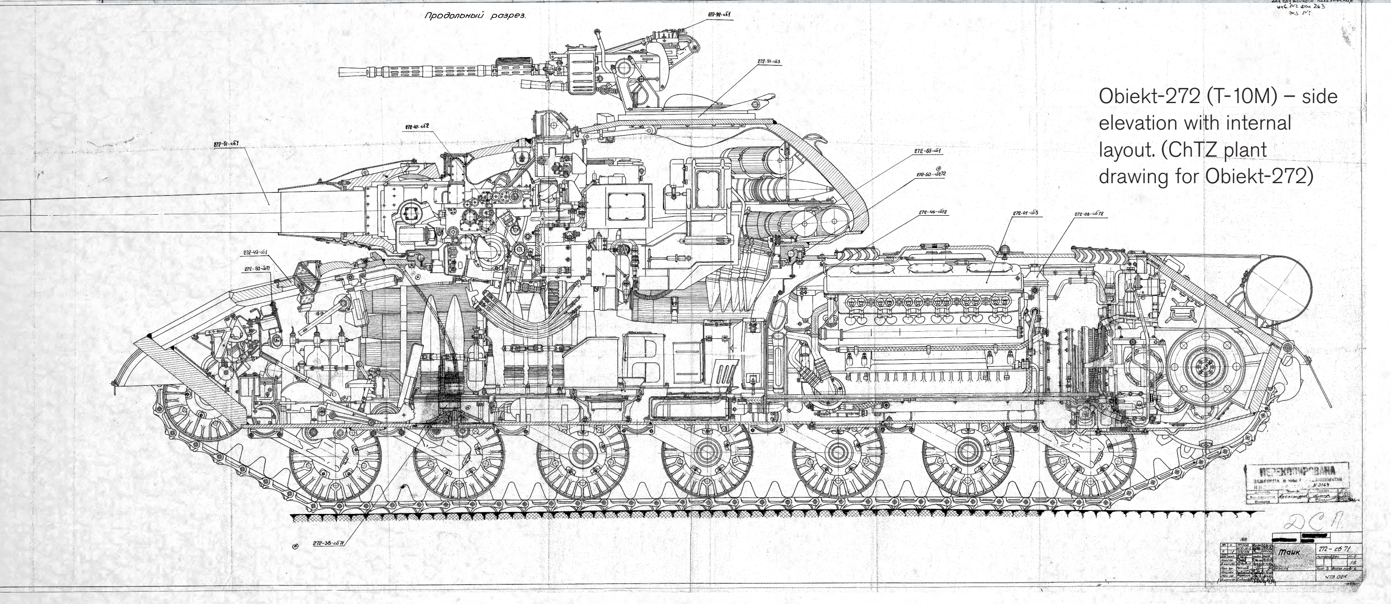

730-35-4
730-35-3
730-35-1
Узел I

BELOW: Obiekt-730 (T-10) – track mud scraper. (LKZ plant drawing)

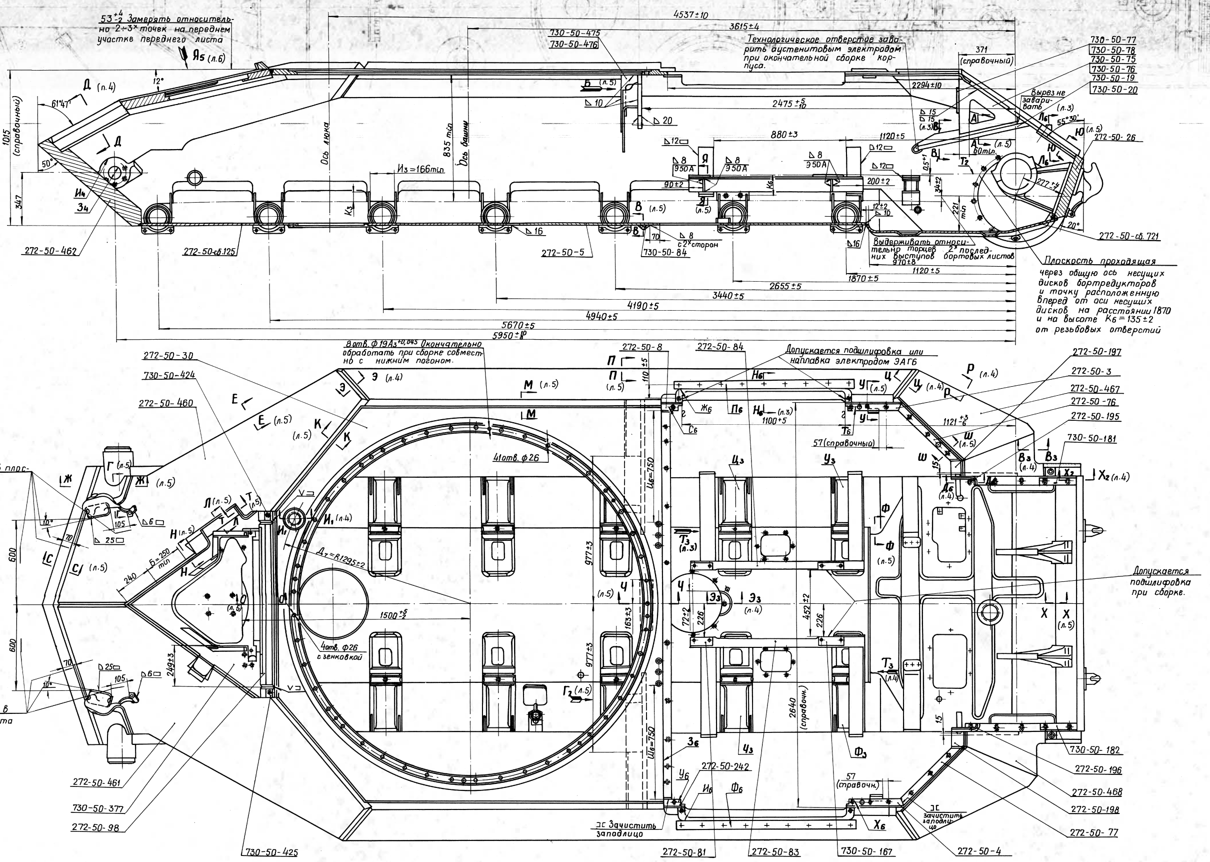

730-30-1
730-30-2
30°±30'
Технические условия:
1. При запрессовке очистителя кронштейн нагревать не выше 330°С
2. Все поверхности, за исключением привалочных плоскостей и отверстий, окрасить эмалью хаки ~~ТУ МХП 558-41~~ ТУ6-10-1289-72
Перед окраской все необрабатываемые поверхности очистить и грунтовать
~~грунтовкой №138 ГОСТ 4056-48.~~
~~грунтовка №138 МРТУ6 10-578-64.~~
грунтовкой ФЛ-03К ГОСТ 9109-59
Электрод Э50 ГОСТ 9467-75
Краска МА-011 хаки
730-30-2 Очиститель 1
730-30-1 Кронштейн 1
Обозначен Наименован. Кол Прим
Очиститель левый в сборе
730-30-сб105
Литера Вес Масш
20,5 1:1
Лист Всего л-ов

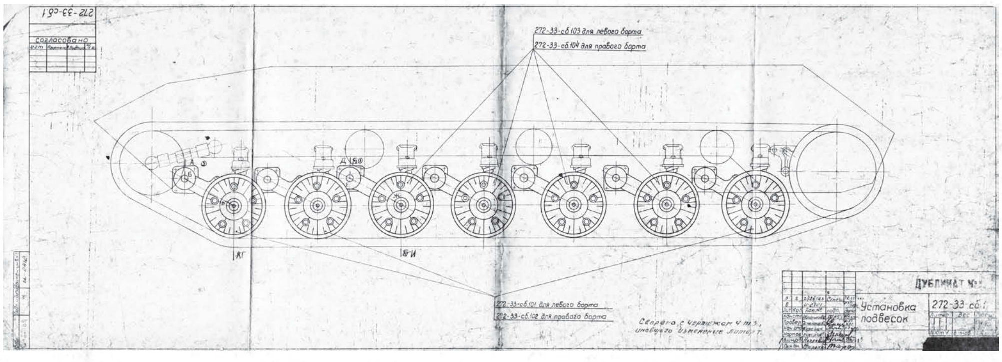

согласовано
φ805
φ712

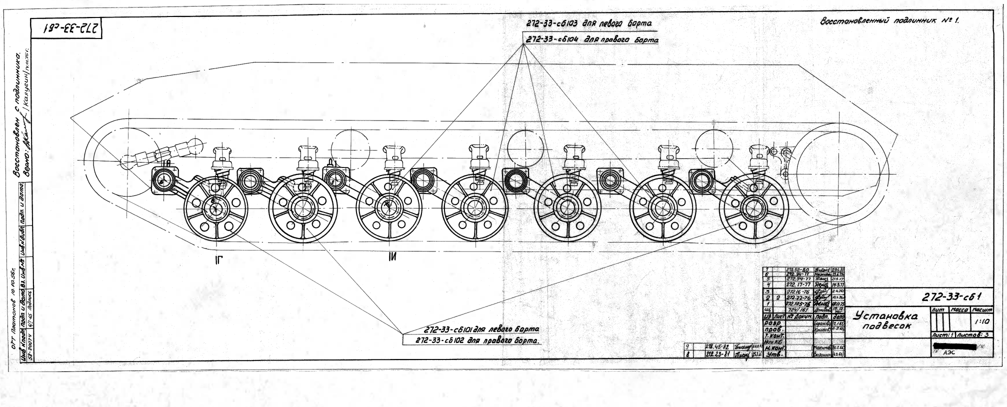
Obiekt-730 (T-10) – proposed 14.5mm KPVT mounting for the original T-10. (LKZ plant drawing)


Продольный разрез.
ПЕРЕКОПИРОВАНА
ДСП
Танк

Obiekt-272 (T-10M) – side elevation with internal layout. (ChTZ plant drawing for Obiekt-272)


4537±10
3615±4
53°+4-2 Замерять относительно 2÷3х точек на переднем участке переднего листа
730-50-475
730-50-476
Технологическое отверстие заварить аустенитовым электродом при окончательной сборке корпуса.
371 (справочный)
730-50-77
730-50-78
730-50-75
730-50-76
730-50-19
730-50-20
Вырез не заваривать
2294±10
2475±10
880±3
1120±5
Ось люка
Ось башни
835 min
Из=166 min
1015 (справочный)
347
272-50-462
272-50-сб.125
272-50-5
730-50-84
272-50-26
272-50-сб.721
Выдерживать относительно торцов выступов 2х последних бортовых листов 970±8
1870±5
1120±5
2655±5
3440±5
4190±5
4940±5
5670±5
5950±10
Плоскость проходящая через общую ось несущих дисков бортредукторов и точку расположенную вперед от оси несущих дисков на расстоянии 1870 и на высоте К6=135±2 от резьбовых отверстий
8 отв. ф19А3 Окончательно обработать при сборке совместно с нижним погоном.
272-50-30
730-50-424
272-50-460
272-50-8
272-50-84
Допускается подшлифовка или наплавка электродом ЭАГ6
272-50-197
272-50-3
272-50-467
272-50-76
272-50-195
730-50-181
Размеры даны в плоскости листа.
41 отв. ф26
1500
4 отв. ф26 с зенковкой
57 (справочный)
Допускается подшлифовка при сборке.
2640 (справочн.)
Размеры даны в плоскости листа
272-50-461
730-50-377
272-50-98
730-50-425
Зачистить заподлицо
272-50-242
272-50-81
272-50-83
730-50-167
272-50-4
730-50-182
272-50-196
272-50-468
272-50-198
272-50-77

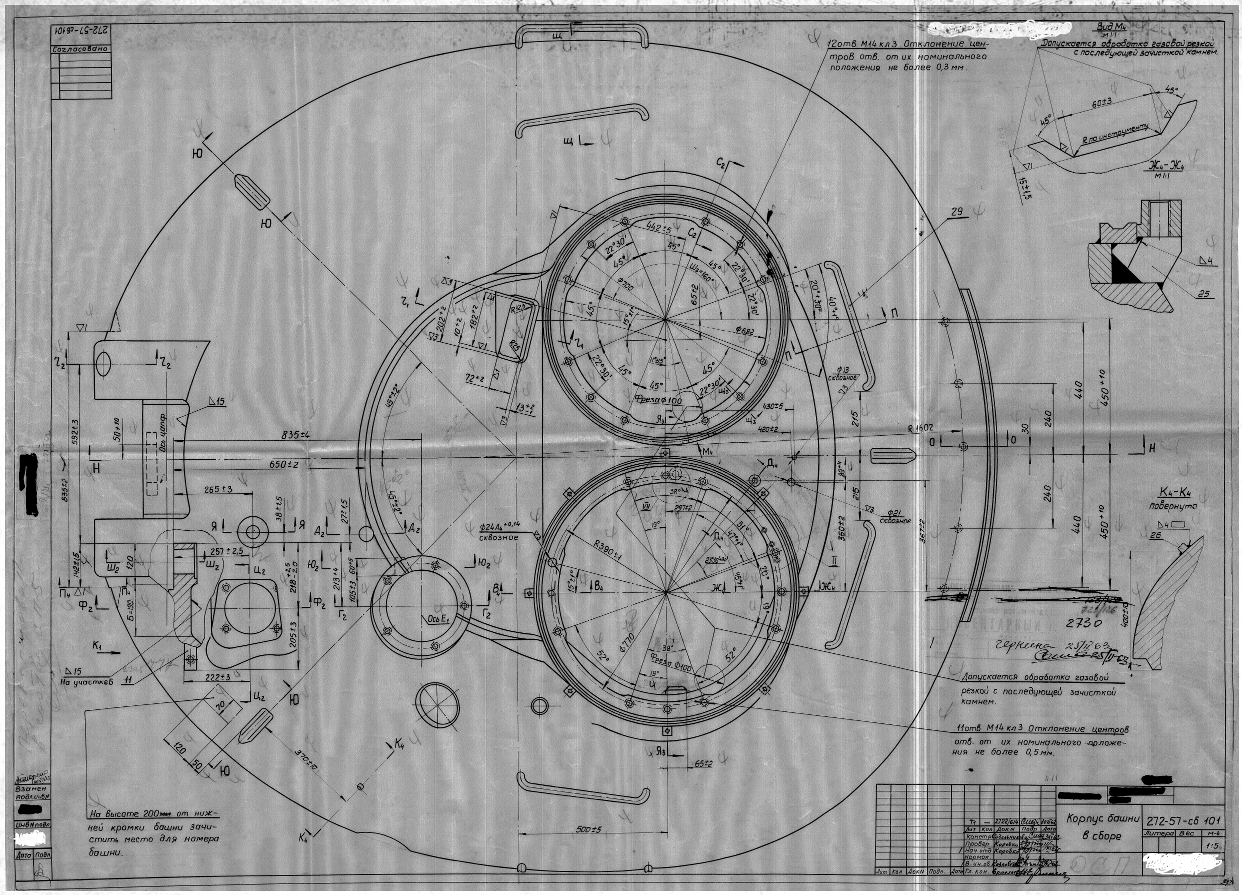

272-33-сб1
272-33-сб103 для левого борта
272-33-сб104 для правого борта
272-33-сб101 для левого борта
272-33-сб102 для правого борта
Установка подвесок
272-33-сб1
ДУБЛИКАТ №

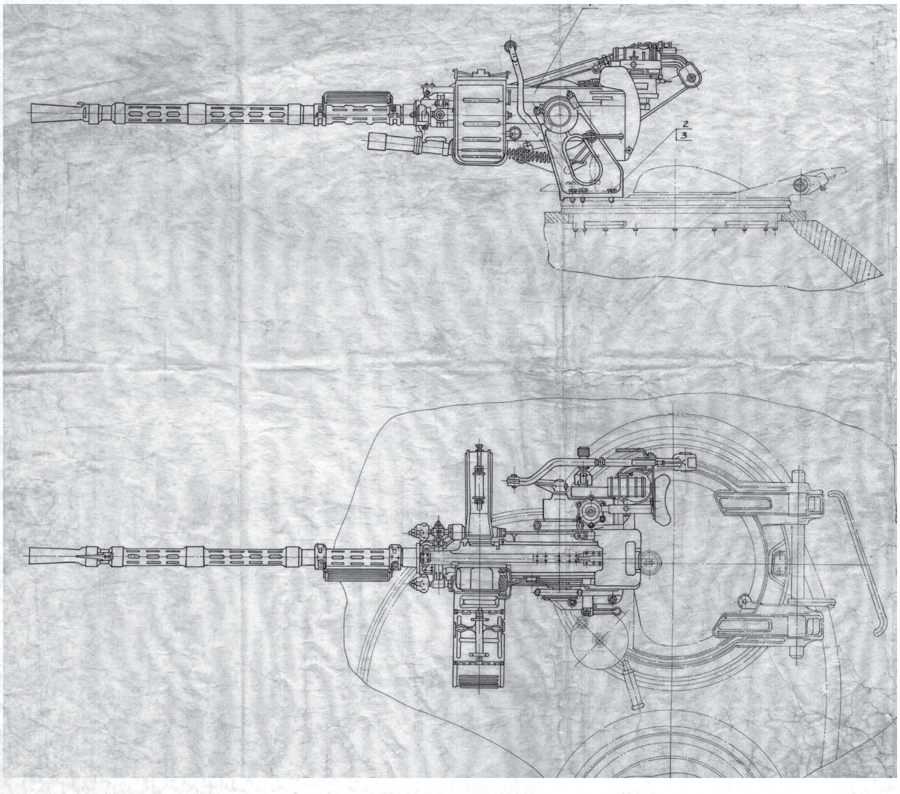

272-33-сб1
Восстановленный подлинник № 1.
272-33-сб103 для левого борта
272-33-сб104 для правого борта
272-33-сб101 для левого борта
272-33-сб102 для правого борта
Установка подвесок
272-33-сб1
1:10

TOP: Obiekt-272 (T-10M) – side and plan elevations – hull. (ChTZ plant drawing dated 1963)

MIDDLE: Obiekt-272 (T-10M) – side elevation – suspension layout. (ChTZ plant drawing dated 1963)

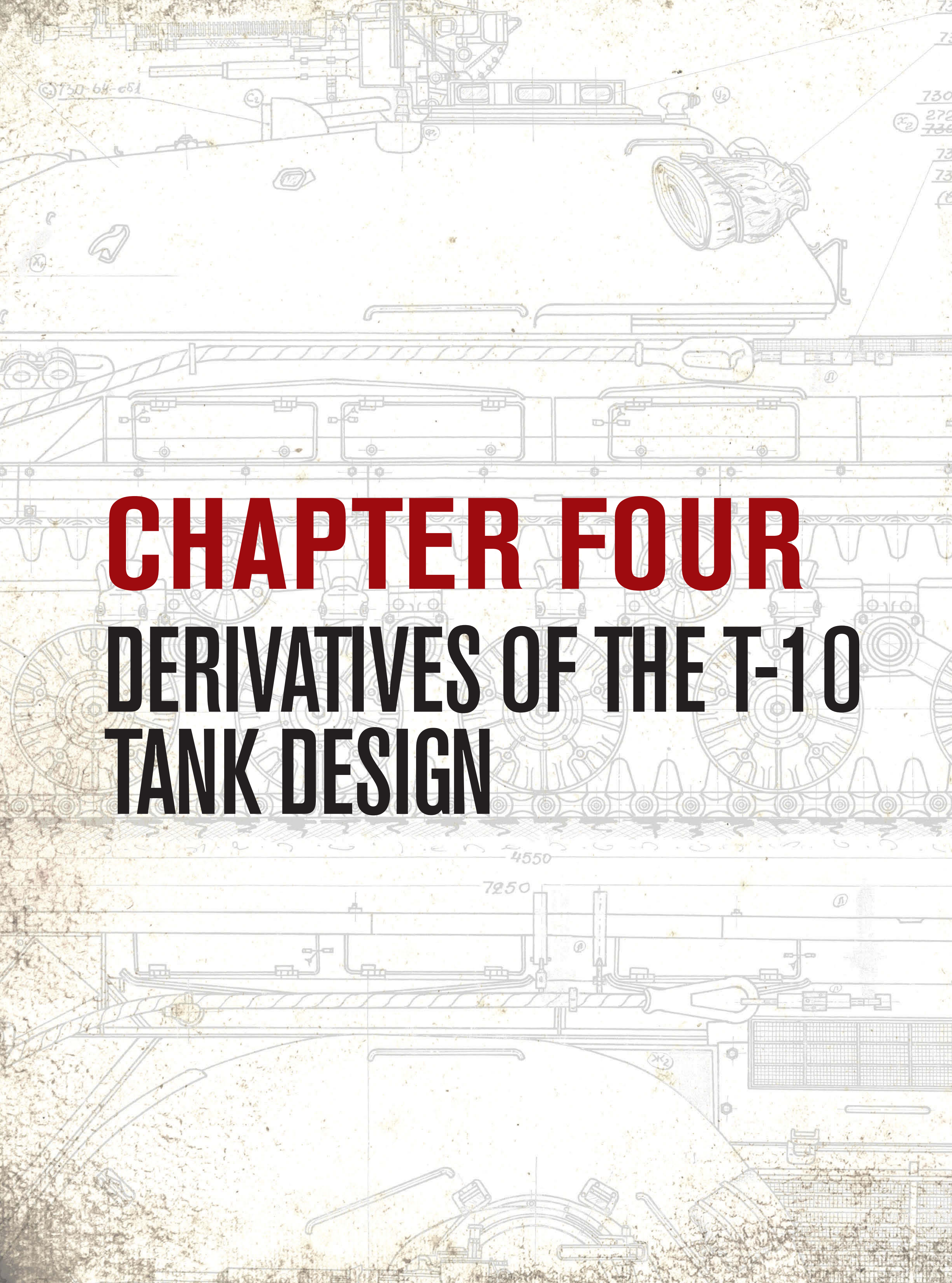
BOTTOM: Obiekt-272 (T-10M) – side elevation – proposed new suspension. (ChTZ plant drawing dated 1965)


272-57-сб101
Согласовано
12отв М14 кл3 Отклонение центров отв. от их номинального положения не более 0,3 мм.
Вид М4 М1:1
Допускается обработка газовой резкой с последующей зачисткой камнем.
Ж4-Ж4 М1:1
К4-К4 повернуто
Допускается обработка газовой резкой с последующей зачисткой камнем.
11отв М14 кл3. Отклонение центров отв. от их номинального положения не более 0,5 мм.
На высоте 200мм от нижней кромки башни зачистить место для номера башни.
Корпус башни в сборе
272-57-сб 101
1:5



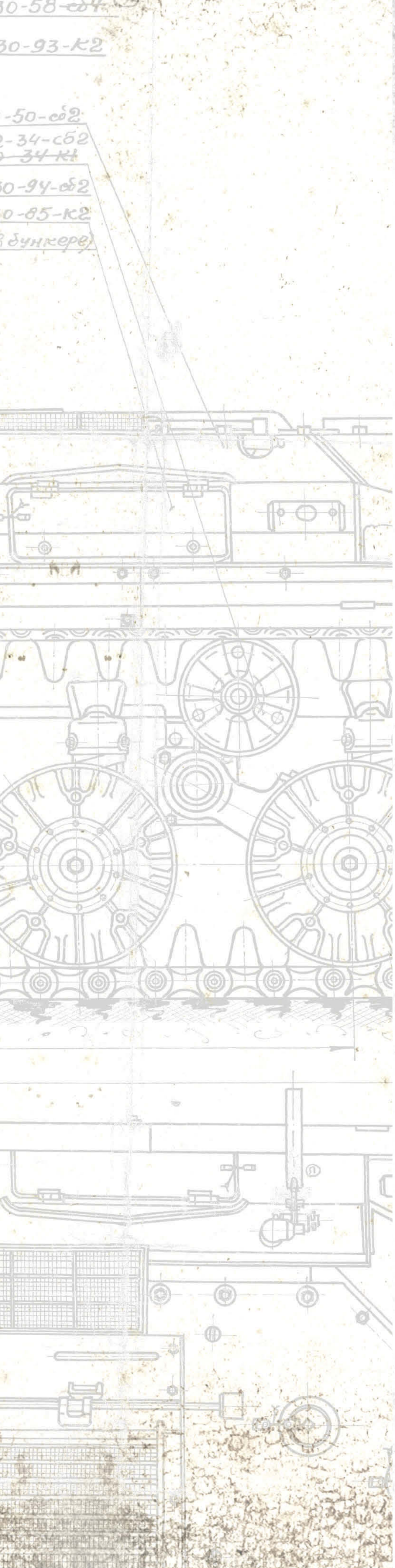
TOP: Obiekt-272 (T-10M) – plan elevation – turret. (ChTZ plant drawing dated 1962)

LEFT: Obiekt-272 (T-10M) – 14.5mm KPVT AAMG. (ChTZ plant drawing)



CHAPTER FOUR

DERIVATIVES OF THE T-10 TANK DESIGN



OBIEKT-200 SERIES DEVELOPMENTS (NOMINALLY LKZ PROJECTS)

IMT MINE CLEARING VEHICLES (OBIEKT-211, OBIEKT-213, OBIEKT-220)

The ‘Inzhenernogo Minnogo Tralshika’ (IMT) mine clearing vehicle or simply ‘tralshik’ (trawler) was a 9.5 tonne combined roller and mine plough system mounted on the front of a turretless T-10M chassis, consisting of a full width boom of ten rollers and two sets of track width mine ploughs. It was tested for service with the Soviet Army at the Uralskogo Voenniy Okrug – UrVO (Urals military region polygon) in 1962.

The IMT was developed from the late 1950s at the OKB-200 design bureau, which specialized in developing mine clearance equipment, at a time when the bureau was already working on a new generation of mine clearance vehicle based on the T-55 chassis, and on new mine clearance systems for use with the next generation of MBTs.

The IMT was developed on the T-10M chassis as a direct result of a meeting between V. I. Mikhailov, the chief designer at OKB-200*, and a former college classmate then working at the ChTZ plant in Chelyabinsk, at which meeting it was suggested that the then current ChTZ built T-10M would be an ideal chassis for such a mine clearing vehicle as it was heavy, better armoured and more powerful than the T-55, not insignificant considerations with a 9.5 tonne mine clearance system hanging off the front of the vehicle. Mikhailov at OKB-200 was reluctant to use the T-10 chassis, as the high cost of Soviet heavy tanks was well understood even at the time; however, ChTZ formally replied that OKB-200 of course only needed the chassis with engine and running gear, not the entire tank, which would mitigate costs. The suggestion was ultimately accepted and the proposed T-10M based mine clearing vehicle prototypes were built. There remained, however, understandable reluctance in some circles.

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* OKB-200 is also sometimes but inconsistently referred to as SKB-200, O – Otdenlniy (independent), S – Spetsialny (special).

Political considerations intervened when on 9 September 1957, in accordance with a resolution of the Chelyabinsk Council Narodnogo Khozaistva (for the purposes of the narrative responsible for production enterprises), the Stankostroitelniy plant named after S. Ordzhonikidze and Plant No. 200 were amalgamated, with the new management team being significantly more risk averse, which put the IMT project on the T-10M chassis under threat. The project received support, however, from a certain Colonel S. V. Andrievsky within the Scientific Technical Committee. Andrievsky's approval was required for all such work, and he supported the technical merits of using the heavier and well armoured T-10M chassis with the IMT mine clearance system, and the development of the project to prototype testing stage. Andrievsky and Mikhailov then visited P. P. Isakov, the chief of heavy tank construction at ChTZ, at which meeting Isakov agreed to work on the project and to modify the T-10M chassis as required in accordance with OKB-200 specifications.

Unbeknown to the designers at OKB-200, series production of the T-10M as a line tank was about to be cut short at ChTZ and any and all alternative uses for the T-10M tank chassis were therefore being considered by the plant, primarily PTUR rocket armed 'IT' tank-hunter prototypes, but all options were open for consideration, including specialized engineering vehicles.

A design group was assembled at OKB-200, which worked closely with designers at ChTZ on the new project, with the modification of the T-10 chassis at ChTZ being under the control of N. I. Zhukov. Removing the turret, armament and all armament related ancillary equipment from a standard T-10M reduced the combat weight by 13 tonnes and provided a significant amount of internal space.

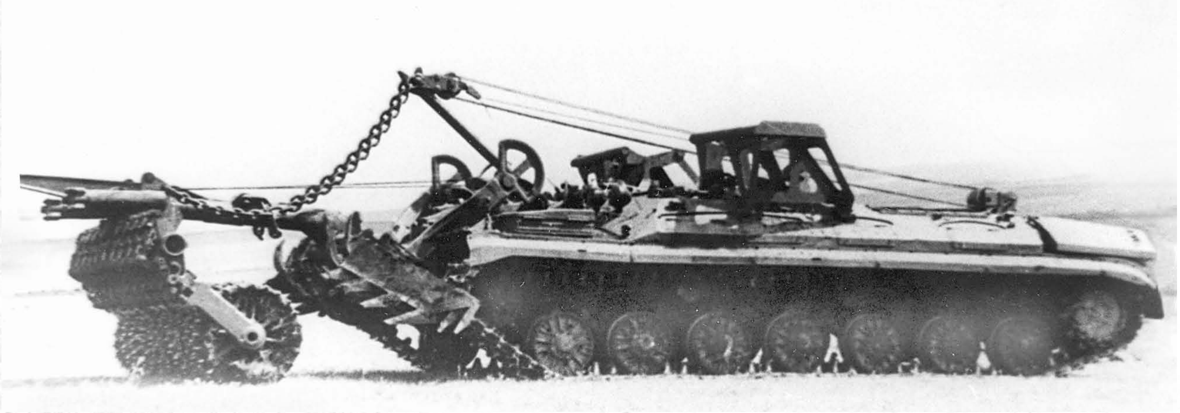
To cope with the additional power requirements for hydraulically lifting the 9.5 tonne trawl assembly attached to the front of the tank, a new 6.5kVt generator and up-rated batteries were installed, replacing the 7hp type of the standard tank. A winch with reduction gearbox was also provided.

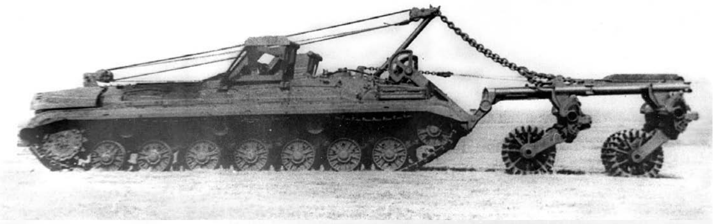
The hydraulic system lifted the mine trawls from their working position suspended in front of the tank to their travel position on the engine deck by rotating the whole system in an arc over the hull roof. There remained concerns regarding overloading the running gear and the engine, main friction drive and the final drives.

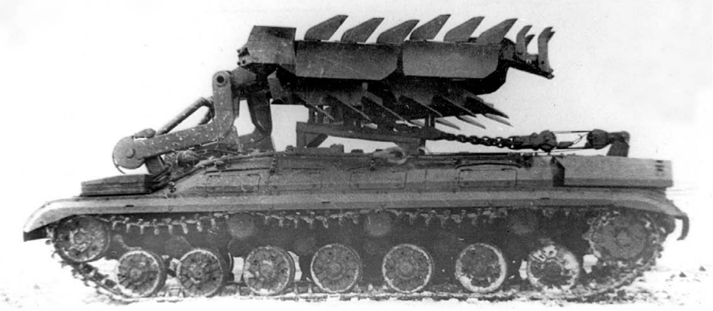
The IMT was provided with radio and internal TPU communications, and a Protivo-Atomnaya Zaschita – Anti nuclear protection (PAZ) NBC overpressure system, allowing it to operate on contaminated ground.

A prototype of the IMT reworked from a T-10M heavy tank by ChTZ and OKB-200 was demonstrated in early 1960 to a meeting attended by Marshal of the Soviet Union V. I. Chuikov and other senior officers. Chuikov enquired whether it was considered intelligent to convert expensive heavy tanks to tracked tractors, and, further, questioned why older vehicles such as the ISU-152 could not be used for such a purpose, as they were still mechanically serviceable but were obsolete as mobile assault guns, and there were at least 1,000 ISU-152s still in service with the Soviet Army looking for a new role. Chuikov nevertheless agreed to allow development of the IMT on the T-10M chassis, but on the proviso that OKB-200 and ChTZ work together to develop an ISU-152 based alternative. The ISU-152 was, however, a significantly older design in tank development terms, and would require considerable rework for such a new role. For instance, it had a small 1.5hp electrical generator as opposed to the 7hp generator on the T-10M (which was nevertheless still considered inadequate for the IMT), while there were concerns with the engine and power-take-off arrangements. In subsequent meetings in Moscow with Chuikov and others, Mikhailov and his OKB-200 designers were told to meet with the heads of the Kiev and Lvov BTRZ tank repair plants where ISU-152s were converted to ARVs and other secondary roles. A joint delegation duly visited these plants in September 1961 to develop the alternative IMT vehicle based on the ISU-152 chassis. This 'derailing process' from an OKB-200 and ChTZ perspective was however fortuitously reversed with the death of Chuikov, which among other results brought new orders to close down the ISU-IMT project as there were insufficient ISU-152s in the Soviet Army for conversion. It turned out that the number of serviceable ISU-152s in operating condition in the Soviet Army was not 1,000, as originally believed, nor even 300, but less than 100, of which most had already been converted to ISU-T ARVs.

The original Obiekt-220 IMT mine trawl vehicle featured a single row of ten mine rollers with KMT-type mine ploughs mounted behind in front of each track. This original concept was tested from 1962 before the Obiekt-211 and Obiekt-213 versions.







Work on the T-10M based IMT continued. At the end of 1961, two vehicles were modified at ChTZ and delivered to Plant No. 200 where the mine trawl equipment was installed. The first type consisted of a single row of ten cast discs on a boom and new KMT-4-type mine ploughs (with four blades rather than three) in front of the tracks (Obiekt-220).

Plant trials were undertaken in the spring of 1962 at the Uralskogo Voennogo Okrug (UrVO) polygon, where the IMT was tested against MV-57, MVZ-57 and TM-57 mines among others.

In converting the T-10M to an IMT mine clearance vehicle, 13 tonnes had been removed and 9.5 tonnes added, but the latter weight was all hanging off the front of the hull. During trials, the mine trawl system was moved from its working position to its travelling position and back 75 times, with 200 position adjustments overall, as a result of which the decision was taken to install an up-rated generator developing 9hp.

TOP: The Obiekt-213 IMT mine trawl vehicle was built and tested in 1964. It featured two rows of mine rollers mounted in tandem.

ABOVE: The Obiekt-211 was one of several alternative engineer mine trawl (IMT) vehicles developed by OKB-200 in combination with ChTZ. The Obiekt-211, with KMT-type mine ploughs but no rollers, was built and tested between 1964 and 1965.

Though more complex and requiring additional electro-hydraulic power systems, the ability to move the mine trawl system from the front of the tank to the rear engine deck maintained the IMT's overall manoeuvrability and was a significant improvement on earlier tank trawl systems.

Following the 1962 trials, another three IMT vehicles were built on the T-10M chassis at ChTZ for testing alternative mine trawl layouts developed at OKB-200. A system with two rows of trawls with four cast discs in each row arranged in pairs, with the rear row covering the area missed by the front row, was built and tested in 1964 (Obiekt-213). An alternative system with KMT-type mine ploughs only was also built and tested in 1964–65 (Obiekt-211).

Meanwhile, however, at the time the modified T-10Ms were being despatched to OKB-200 for assembly of the mine trawls onto the IMT vehicles, other tank plants in the Soviet Union were concentrating on the development of new MBT designs armed with a new generation of powerful gun armament that would ultimately threaten the future of the T-10M and heavy tank in general. P. P. Isakov at ChTZ wrote to OKB-200 formally notifying the mine trawl development bureau that the ChTZ plant had been ordered to cease

T-10M production. Isakov suggested that OKB-200 make contact with the IV (Engineering Forces), specifically the NTKIV (Nauchno-Tekhnicheskii Komitet Inzhenernikh Voisk – the Scientific-Technical Committee of the Engineering Forces) with regard to future steps OKB-200 might take with regard to ongoing mine trawl development that would allow the T-10M chassis to be utilized as originally planned. Isakov also advised OKB-200 that ChTZ fortuitously had the ability to assemble perhaps 200–250 T-10M tank chassis from available components, sufficient for the Soviet Army's IMT vehicle needs should the requirement be confirmed. As Mikhailov quotes in his personal memoirs, this was the third time since its foundation that OKB-200 had found itself without a base chassis on which to mount its mine trawl developments.

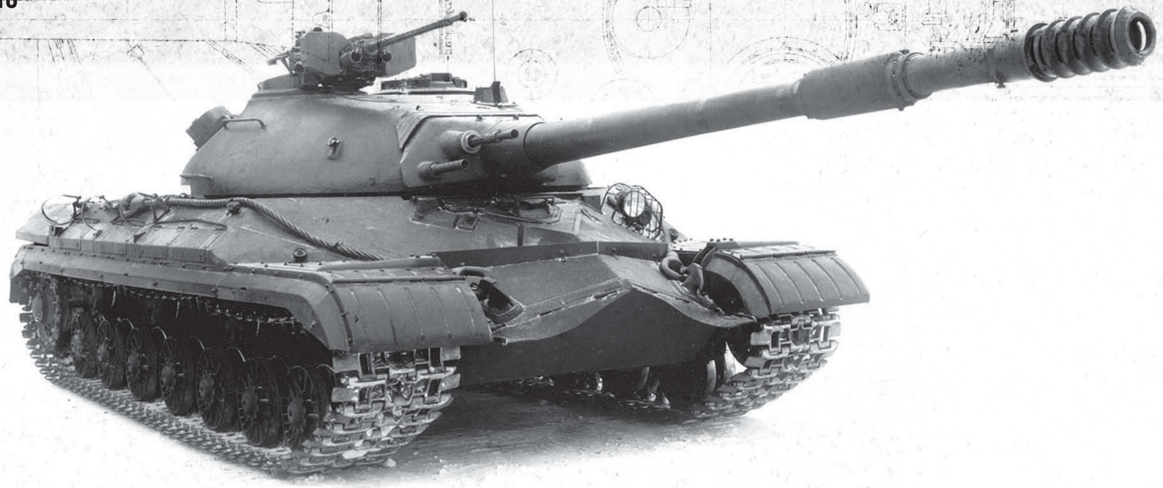
Isakov's hopes for further T-10 chassis assembly at ChTZ were dashed, however, as the decision to close down T-10M production was to be made with immediate effect. OKB-200 could not pursue the alternative ISU-152 chassis route as originally suggested by Chuikov, as the ISU-152 was now both obsolete and unreliable as a donor chassis even if a serviceable quantity were to be made available. The OKB was therefore instructed to develop future mine trawls around the T-64 MBT then in development, and the OKB would in future concentrate on mine trawls for MBTs and BMP MICVs. It would never return to the subject of heavy tank mounted mine trawls.

OBIEKT-265 HEAVY TANK

The Obiekt-265 was built and tested at the KB (OKBT) of LKZ on the basis of the Obiekt-730 under the direction of Iosef Kotin in 1952–53 as a potential alternative or modernization of the original T-10 (Obiekt-730) heavy tank. One of the main aims of the Obiekt-265 was to consider modifications to the main armament and associated sub-systems.

The Obiekt-265 prototype was equipped with the 122mm D-25TEh gun (Eh for 'ehvakuator' or bore evacuator) to test the viability of the bore evacuator system to clear the turret of propellant gases, and was also fitted with a multiple baffle muzzle brake as later introduced on the 122mm M-62-T2 tank gun as standard armament for the T-10M. The Obiekt-265 was fitted with a PUOT fire control system with TAEhN-2 electric drive, TPS-1 periscope sight for the gunner and a stabilized TUP secondary sight, all operating over an elevation range of -3° to +17°. The commander was additionally provided with a TPKU sight/fire control system with which he could assume control of the armament.

The secondary armament was upgraded from the 12.7mm DShKMs of the Obiekt-730 to the 14.5mm KPVT as also later introduced on the production T-10M. The Obiekt-265 was unusual, however, in having two



The Obiekt-265 during evaluation trials, 1952. With its 122mm M-62-T2 main armament and multi-baffle muzzle brake the Obiekt-265 resembles the later production T-10M, but note the mantlet with tandem co-axial machine guns and the 14.5mm KPV anti-aircraft mounting.

co-axial machine guns, a 14.5mm KPVT and a 7.62mm SGMT, with the aim of having a larger overall secondary ammunition complement, with a further 14.5mm KPVT installed on the turret roof on a tourelle mounting as an AAMG.

Three prototype Obiekt-265 prototypes were built in 1954 and submitted for polygon trials, which were successfully completed. Although the Obiekt-265 was not further developed, the new more powerful 122mm M-62-T2 armament was adopted on the future Obiekt-272 (T-10M), for which the Obiekt-265 was effectively the prototype, and on which several design principles were tested and approved.

The Obiekt-265 had an ammunition complement of 30 rounds of AP and HE-FRAG. The AP rounds had a muzzle velocity of 950m/s. Secondary armament ammunition consisted of 510 rounds of 14.5mm and 1,000 rounds of 7.62mm. The tank also carried two AK-47s with a total of 600 rounds.

The hull armour was identical to the Obiekt-730. The cast turret featured armour varying in thickness from 250mm over the frontal aspects to 40mm on the turret roof. The significantly greater internal volume in comparison with the Obiekt-730 allowed the crew to work more efficiently, even allowing for the installation of a larger tank gun. Overall turret armour protection was comparable with the Obiekt-730.

The motor transmission compartment (MTO) was also identical to the T-10 (Obiekt-730) on which it was based. The Obiekt-265 was powered by a V12-5 diesel engine developing 700hp, with a 2.5kVt cooling fan air circulation system. Total fuel capacity was 930 litres, of which 630 litres were internal under armour, with a resultant road range of 240km. A G74 generator provided 3kVt of power. Communications consisted of a 10RT-26Eh radio and TPU-47 laryngaphone system. The driver-mechanic was provided with a TVN-2 night vision system.

The prototype was used for system testing, which proved successful, the evacuator being incorporated on the T-10A, T-10B and T-10M heavy tanks, and also the T-54 MBT from the T-54A onwards.

OBIEKT-266 TRANSMISSION TEST PROTOTYPE

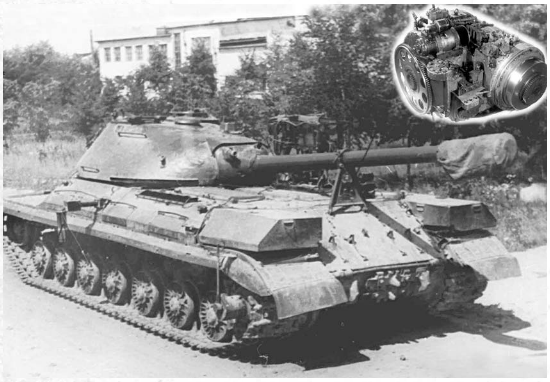
The Obiekt-266 was a prototype developed at the SKB of the Leningrad Kirov Plant (LKZ) in 1957 to test a new automatic hydro-mechanical transmission and also the PUOT-2 gun stabilization system. Soviet tank designers had noted that many American tanks had automatic transmissions, such as the M5 light tank and the M46, M47 and M48 tanks (with 2-speed automatics derived from bus transmissions), and duly experimented with similar installations for incorporation on Soviet medium and heavy tanks. The Obiekt-266 was fitted with a V-12-5 diesel engine developing 700hp, linked to the new transmission, but with the exception of the PUOT-2 gun stabilization system was otherwise a standard tank. The Obiekt-266 as tested had a maximum road speed of 42km/h and a range of 200km, while with the modified transmission the tank maintained the required maximum combat weight of exactly 50 tonnes.

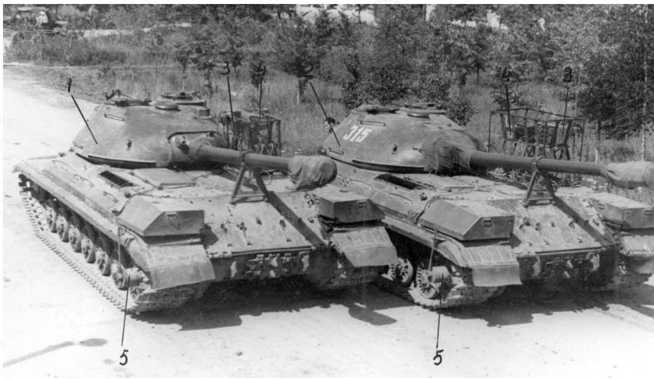
The Obiekt-266 was not developed to the stage of series production, as ultimately Soviet tank designers considered that 5- to 7-speed manual transmissions were more flexible and provided much better fuel economy and range.

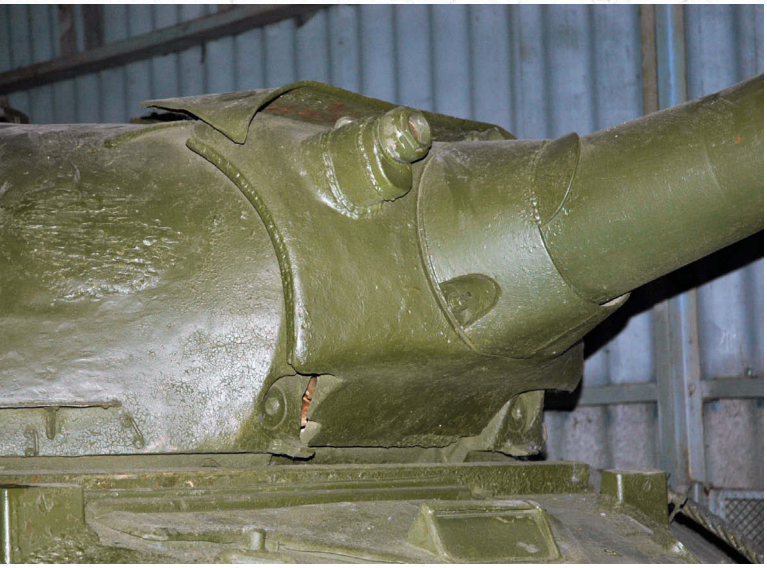
BELOW: Two Obiekt-266 prototypes during plant trials. Note the hydraulic motors mounted to the drive sprockets and the temporary hydraulic power packs located on the engine decks.

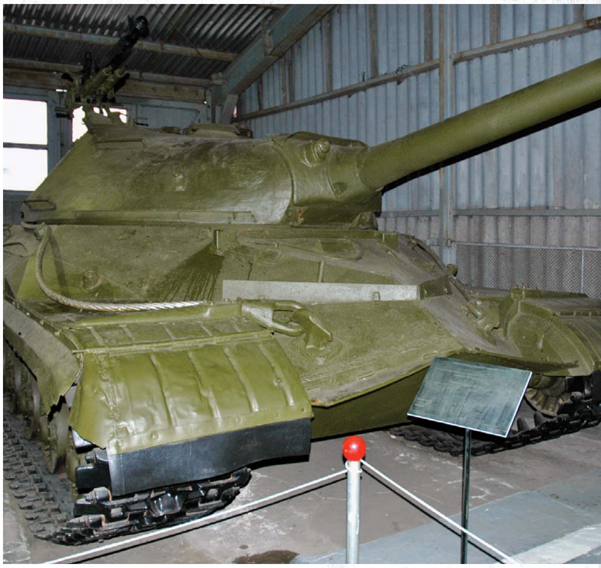
LEFT: The hydro-mechanical transmission as tested in the Obiekt-266.

BOTTOM: The Obiekt-266 during evaluation trials at NIIBT Kubinka.



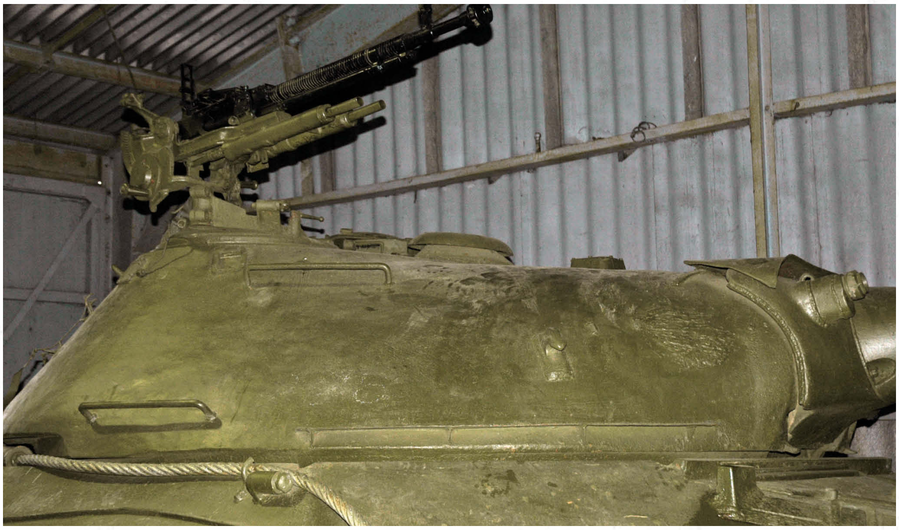






ABOVE: The Obiekt-266 gun mantlet and 12.7mm co-axial machine gun mounting. The turret armour scars are identical to those of the Obiekt-266 in the plant trials photographs.

ABOVE RIGHT: One of the Obiekt-266 prototypes, located at the Kubinka Tank Museum.



RIGHT: The 12.7mm DShKM AAMG was replaced by the 14.5mm KPV on the T-10M.

OBIEKT-267 FIRE CONTROL SYSTEM PROTOTYPE

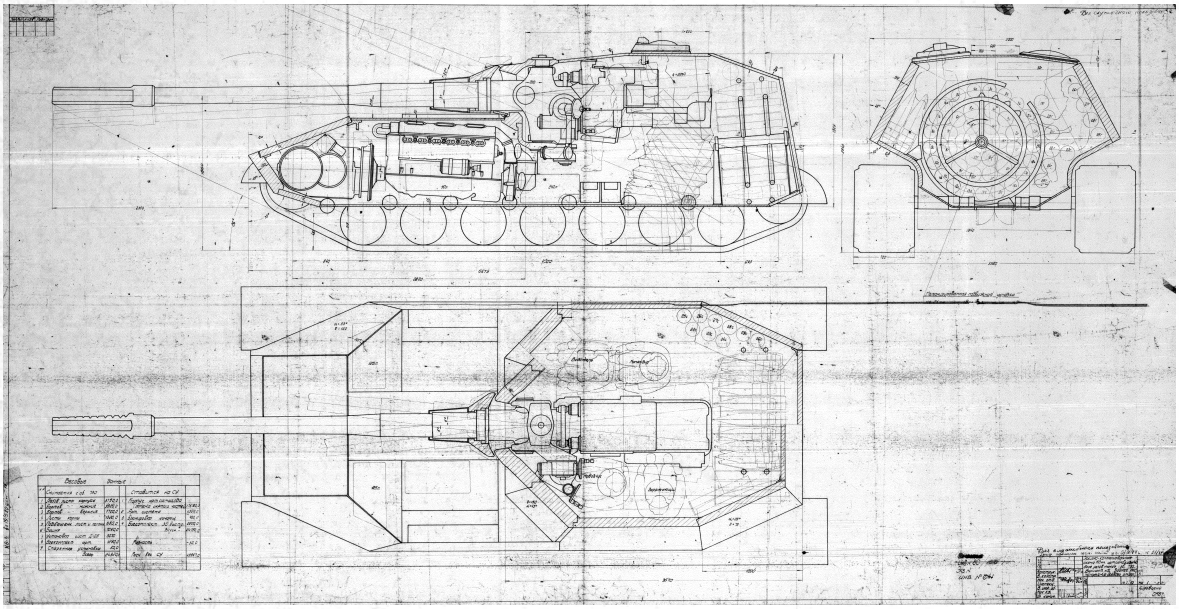
The Obiekt-267 was an Obiekt-730 based heavy tank prototype that mounted the test-bed versions of the various incarnations of the T-10's PUOT fire control systems. Variant 1 (Obiekt-267sp1) became the production T-10A with the PUOT-1 system, and Variant 2 (Obiekt-267sp2) became the T-10B with the PUOT-2 system. Five prototypes were built in 1955 for evaluation purposes, with the tank accepted into service with the Soviet Army as the T-10A by the Soviet Ministry of Defence on 11 July 1956.

OBIEKT-268 SELF-PROPELLED GUN

The Obiekt-268 (SAU-152) self-propelled gun (SPG) was developed on the T-10 chassis at the KB (OKBT) at LKZ in Leningrad under the direction of Iosef Kotin in accordance with a resolution of the Council of Ministers of the USSR (SM SSSR) dated 2 July 1952.

Soviet heavy tank destroyers had performed a crucial role during World War II, and the SU-100 medium and ISU-122 and ISU-152 continued in stellar service in the immediate post-war years. The development of post-war self-propelled artillery was protracted, however, and though several designs were developed and prototypes evaluated, none ultimately entered series production.

Post-war heavy self-propelled gun development continued on the basis of such vehicles being heavily armoured over their frontal aspects, reflecting their tactical 'IT' or 'Istribitel-Tank' (tank hunter) role rather than use as self-propelled artillery in the Western sense, with armament being based on a high muzzle velocity 152mm gun. Such SPG developments began as early as late 1945, on the basis of the Obiekt-260 (IS-7) and Obiekt-701 (IS-4) heavy tanks, followed by the IS-4 based Obiekt-715, for which the proposed armament was a 152mm M-31 howitzer, with identical ballistics to the 152mm Br-2 tracked howitzer, to be developed at Plant No. 172. LKZ in Leningrad also considered using the same weapon in the proposed Obiekt-261/Obiekt-263. Meanwhile the KB at Plant No. 172 proposed as an alternative the use of a more powerful gun, the 152mm M-48, with a



The plant concept drawings for the Obiekt-730 SPG Variant No. 2 envisaged a rear mounted casemate and front mounted engine arrangement.

muzzle velocity of 1,000m/s for installation on the proposed Obiekt-262 SPG based on the IS-7 chassis. The IS-4 entered moderate series production and was thereby a realistic chassis for heavy SPG variant development; however, IS-4 production was proving to be a challenge, while the IS-7 was so technically complex that it was simply too risky to develop as a production tank at the time. All thoughts of SPG development using such chassis were curtailed on 18 February 1949 when Resolution No. 701-270ss of the SM SSSR cancelled the further development of heavy tanks with a combat weight of more than 50 tonnes, which naturally also curtailed the further development of self-propelled guns on such chassis.

Meanwhile, in April 1949 work began on the design drawings for the 730, initially the projected IS-5 heavy tank, later to become the IS-8 and latterly the series production T-10. The urgency to develop the new tank type (not least because of the tremendous operational difficulties being encountered with the IS-3 in service) was such that the first '730' prototype was completed at ChKZ in Chelyabinsk by 14 September the same year. Self-propelled gun variant development did not immediately follow, however, pending a clear indication that the Obiekt-730 would become a production tank. The go-ahead to develop self-propelled assault gun versions of the new heavy tank design was given on 2 June 1952. The armament for a SPG version of the Obiekt-730, later to become the Obiekt-268, was clearly defined as the Plant No. 172 developed 152mm M-53, a modification of the weapon originally developed for the Obiekt-116 (SU-152P). This was one of several SAU concepts developed in the early 1950s, ignored in the 1960s and eventually introduced in the 1970s as the 2S series of self-propelled guns – the 'lost generation' of Soviet self-propelled artillery. The 152mm M-53 with a muzzle velocity of 760m/s was developed in parallel with the M-31 and M-48, the latter being ultimately installed on the Obiekt-116 (SU-152P) SPG in 1948, though the latter SAU did not as stated progress beyond the stage of prototype testing.

Work on the new heavy SPG, with at the time no assigned specific designation other than Obiekt-730 SPG, was undertaken at the Leningrad OKTB bureau at LKZ in Leningrad, under the supervision of P. P. Isakov. Soviet archive material indicates that a total of five variants of the Obiekt-730 SPG – the future Obiekt-268 – were ultimately developed; however, two of these designs pre-date agreement on the final development specifications (TTTs), and they never received the 'official' designation Obiekt-268, so that there were three remaining 'post-factum' designs that are officially classified as the Obiekt-268. Two of these were evolutions of the earlier and unofficial plant initiative design projects, which were modified and re-presented – now officially – in December 1952. Development of the 152mm M-53 armament intended for these self-propelled guns continued as a parallel 'work in progress', elements of which would later be used on the 122mm M-62T tank gun.

The original Obiekt-730 SPG plant concept drawings were completed by 25 April 1952, offering staggeringly different alternative configurations for what was intended as a weapon for use with Soviet self-propelled gun regiments.

Obiekt-730 SPG Variant No. 1

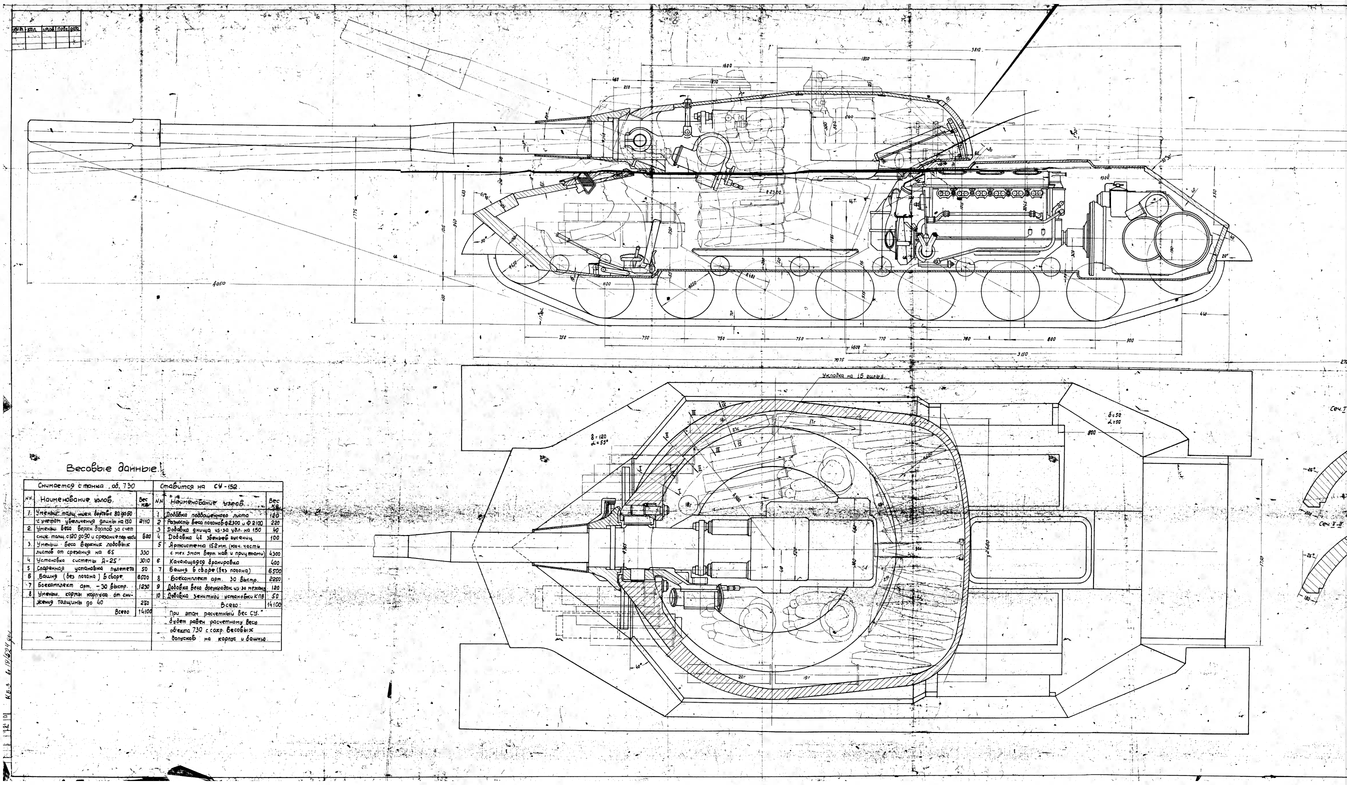
Obiekt-730 SPG Variant No. 1 was in principle the front mounted casemate form that would ultimately be developed to prototype stage as the Obiekt-268.

Obiekt-730 SPG Variant No. 2

Obiekt-730 SPG Variant No. 2 envisaged the use of a rear casemate-fighting compartment, with 150–180mm frontal and 90mm side armour on the casemate. The main armament was to be fed by drum magazines located behind the breech at the casemate rear. The engine and transmission department (MTO) was relocated to the front of the vehicle, while (due to a lack of space in the MTO) the driver-mechanic was relocated to the right side of the fighting compartment. The 75mm basis hull glacis armour was less than the casemate, but angled at 70°, with the MTO department providing additional protection for the crew. The rear casemate design minimized the frontal barrel overhang, with a relatively short overall length of 6.675m. Obiekt-730 SPG Variant No. 2 had a crew of four.

Obiekt-730 SPG Variant No. 3

Obiekt-730 SPG Variant No. 3 was even more radical, and considered a conventional turret installation, more akin to a conventional heavy tank design. The turret was however designed from scratch, with the turret ring increased from 2,100m to 2,300m to accommodate the larger 152mm calibre main armament, and a projected maximum turret armour basis of 200mm. A 30 round ammunition complement was envisaged, to be entirely located in the turret rear to reduce the loader's workload. The base '730' hull would need to be lengthened 150mm to accommodate the turret changes, and it was therefore envisaged to reduce the hull armour significantly in all areas except the glacis in order to maintain the combat weight under 50 tonnes. A 14.5mm KPV heavy machine gun was to be installed for air defence on the turret roof.



Весовые данные!

Снимается с танка об. 730		
NN	Наименование узлов.	Вес кг.
1.	Уменьш. толщ. нижн. бортов с 80 до 60 с учетом увеличения длины на 150	2110
2.	Уменьш. веса верхн. бортов за счет сниж. толщ. с 120 до 90 и срезание пер. части	820
3.	Уменьш. веса верхних лобовых листов от срезания на 65	330
4	Установка системы Д-25	3010
5	Спаренная установка пулемета	50
6	Башня (без погона) в сборе	6500
7	Боекомплект арт. – 30 выстр.	1230
8	Уменьш. кормы корпуса от снижения толщины до 40	250
	Всего	14100

Ставится на СУ-152.		
NN	Наименование узлов.	Вес кг.
1	Добавка подбашенного листа	120
2	Разность веса погонов Ф2300 и Ф2100	220
3	Добавка днища из-за удл. на 150	40
4	Добавка 4х звеньев гусениц	100
5	Артсистема 152мм. (кач. часть с мех змом верт. нав. и прицелами)	4300
6	Качающаяся бронировка	400
7	Башня в сборе (без погона)	6500
8	Боекомплект арт. 30 выстр.	2250
9	Добавка веса боеукладок из-за механиз	120
10	Добавка зенитной установки КПВ	50
	Всего:	14100

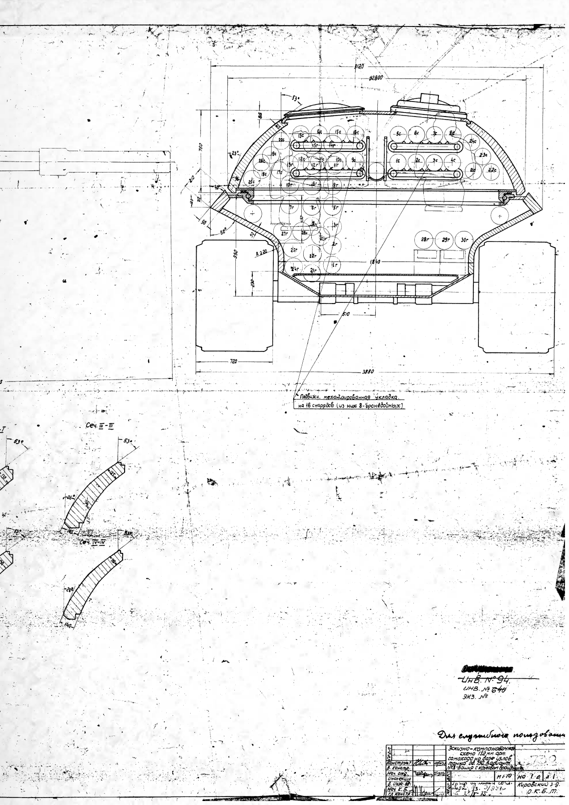
При этом расчетный вес СУ будет равен расчетному весу объекта 730 с сохр. весовых допусков на корпус и башню.

The Obiekt-730 SPG Variant No. 3, though defined by the plant as a 152mm SPG, rather resembles a heavy tank with 152mm main armament.

The plant initiative design work on these self-propelled gun variants of the Obiekt-730 was legalized by the Soviet Council of Ministers (SM SSSR) on 2 July 1952, with the self-propelled variant of the new heavy tank henceforth being referred to as the Obiekt-268.

Obiekt-730 SPG Variant No. 4

Plant initiative SPG Variant No. 2 of the Obiekt-730 SPG (Obiekt-268) was subsequently reworked by OKTB at LKZ under the direction of Iosef Kotin as 'Variant No. 4', with the project prepared by 18 December 1952. Externally, the fourth variant resembled the earlier second variant, but the hull was lengthened to 6.9m, almost as long as the Obiekt-730 tank, thereby reducing the frontal barrel overhang by 150mm. The casemate side armour was no longer angled in order to increase the internal volume of the fighting compartment, as, in line with the new TTTs, the crew was increased to five with the addition of a second loader located behind the commander, who was provided with a new cupola fitted with a rangefinder and a machine gun installation. The 'drum' ammunition feed system from the original Variant No. 2 design remained intact. There were some modifications to the armour

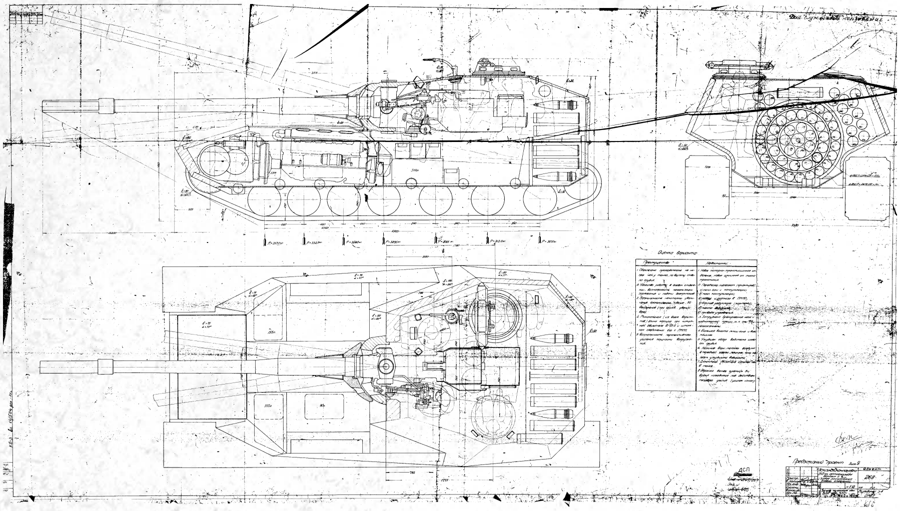


to accommodate the change in casemate shape while remaining within the 50 tonne combat weight design limit, while the modified variant was considered as having potential for further armament upgrades.

Obiekt-730 SPG Variant No. 5

On 10 December 1952 the re-developed third variant of the SPG was completed, now re-designated Variant No. 5. The turret design was modified, with a four-man turret crew including two loaders located at the turret rear, for a total vehicle crew of five. The commander was now provided with a cupola in the forward part of the turret. After some experimentation with prototype heavy machine gun mountings, a 14.5mm KPV AAMG was installed on the roof.

The hull length remained as for the Obiekt-730 (6.925m), with modifications to the shape of the hull glacis and upper side armour but no change in armour thickness. The V-12-6 engine, as later used on the T-10M, was to be installed.



The officially sanctioned Variant No. 4 of the new 152mm SPG is now defined on the drawings as Obiekt-268 rather than Obiekt-730 152mm SPG as on earlier drawings.

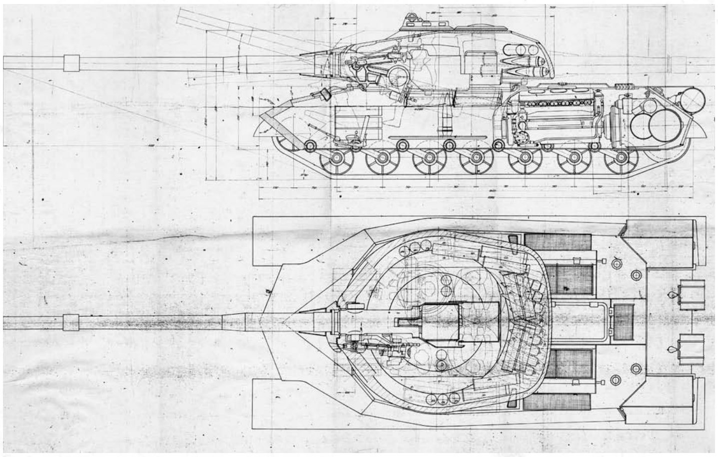
Variant Nos. 4 and 5 were short lived. In January 1953, the projects were presented to the Scientific-Technical Committee (NTK GBTU i MTiTM), where both were rejected due to the significant changes needed to the base Obiekt-730 chassis. Instead, a less drastic alternative was proposed, using the slightly more compact V-12-6 engine originally considered for Variant No. 5.

The Final Obiekt-268

The reworked Obiekt-730 SPG project, with a forward mounted casemate-type fighting compartment and a modified V-12-6 engine, was re-presented to the GBTU scientific-technical committee (NTK GBTU i MTiTM) in June 1953 in the form of modified drawings and a 1:10 scale model, with the summary and recommendations on the now Obiekt-268 released on 25 August, and signed off by the commander of BTiMV, Colonel-General A. I. Radzievsky.

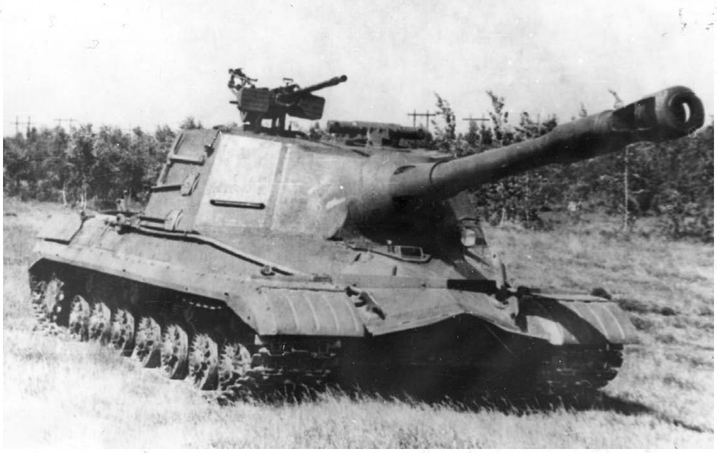
The definitive prototype was armed with a casemate mounted 152mm M-64 gun (with the multiple baffle muzzle brake replaced by a double baffle muzzle brake at the last minute), with a bore evacuator located immediately behind, and co-axial 14.5mm KPVT secondary armament. A stereoscopic rangefinder was mounted on the casemate roof. The Obiekt-268 had a crew of five, which ultimately included two loaders, with the intent to reduce the crew to four when a mechanized loader was perfected.

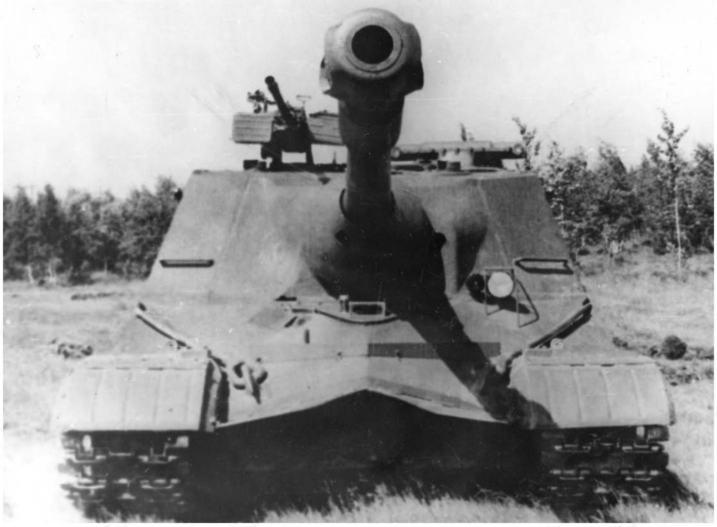
On 25 August 1953 the commander of BTiMV, Colonel-General Radzievskiy, gave the conclusion of NTK GBTU & OKBT LKZ and provided formal approval to take the project to prototype development and trial evaluation stage, which was duly reviewed by MTiTM, GBTU and GAU in 1954. Work on the Obiekt-268 continued under the direction of chief engineer N. M. Chistyakov, who had previously worked in Nizhny Tagil as the head of the New Projects department, where among other projects he had started the work on the Obiekt-140 MBT before being re-assigned to LKZ in Leningrad. The overall management of SPG development at LKZ remained under the supervision of N. V. Kurin. The final version of the Obiekt-268 SPG design drawings was completed on paper in June 1954.

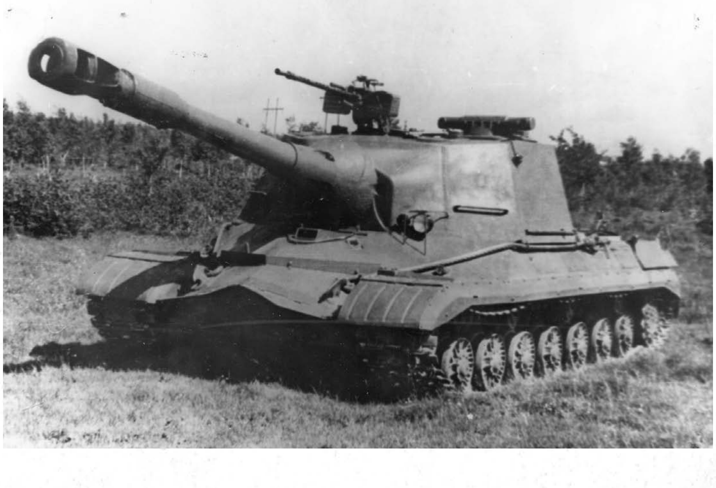


As with Variant No. 4, the officially sanctioned Variant No. 5 of the Obiekt-268 is defined as such rather than Obiekt-730 SPG as it started out. Variant No. 5, a development of Variant No. 3, and still very much resembling a conventional heavy tank, now had a four-man turret crew.

A principal reason for the laboriously slow development of Obiekt-268 SPG related prototypes was that the proposed 152mm main armament had lower priority at Plant No. 172 in Perm than the 122mm M-62T tank gun intended for the future Obiekt-752 and Obiekt-777 tank designs. The 152mm calibre SPG variant of the 122mm weapon was completed at the beginning of 1954. Development of the 152mm M-53 intended for installation on the Obiekt-268 took seven years from conception to production in steel, an inordinate time in tank gun development terms. During development, the 152mm M-53 morphed into the re-designated 152mm M-64, which had a shorter barrel while retaining the same 750m/s muzzle velocity. This was significant, in that the casemate-superstructure fighting compartment of the Obiekt-268 was in the same location as on the T-10 tank on which it was based, i.e. forward mounted. The M-53 had a total length from axis of rotation to the end of the muzzle brake of 5.845m, shortened to 4.203m on the M-64, which correspondingly reduced the







TOP: The Obiekt-268 during field trials at the NIIBT polygon, Kubinka.

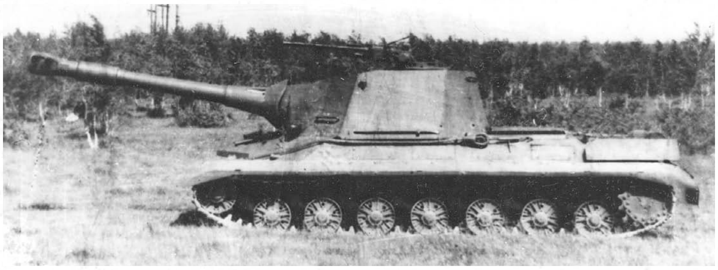
MIDDLE: Front view of the Obiekt-268 during trials at the NIIBT polygon, Kubinka. The casemate superstructure had similar armour to the base T-10, with an ideal shape for ballistic protection.

BOTTOM: The Obiekt-268 during evaluation trials. Note the stereoscopic rangefinder and 14.5mm KPVT AAMG.

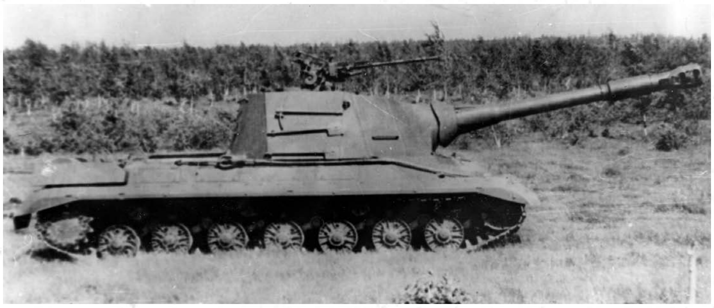
barrel frontal overhang to 2.185m. As experience with the SU-100 medium SAU had shown, a very long barrel made for operational difficulties in rough terrain.

The 152mm M-64 technical project was officially reviewed by GAU in August 1954, though the OKTB at the Leningrad Kirov Plant had received the same documentation earlier to assist them with integration of the armament into the Obiekt-268. Surviving plant documents dated 20 June 1954 show a vehicle very similar to the final version of the Obiekt-268 produced in prototype form.

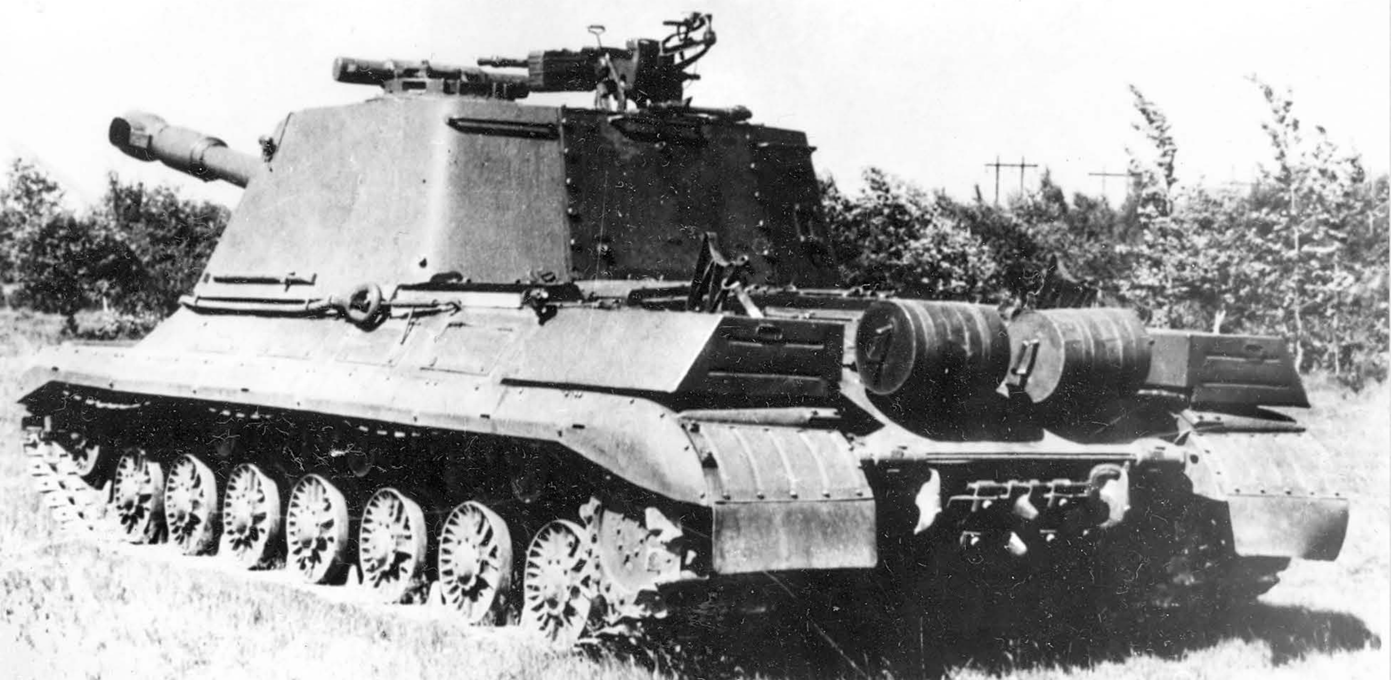
The Obiekt-268 was almost identical in combat weight to the T-10 heavy tank on which it was based. The hull side and rear armour



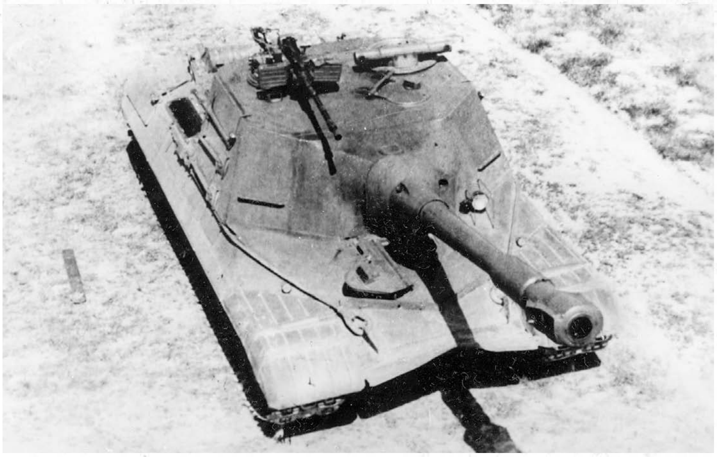
TOP LEFT: The size of the casemate superstructure is evident in this side view taken during evaluation trials undertaken in the spring and summer of 1957.



LEFT: Right side view of the Obiekt-268, NIIBT Kubinka, spring–summer 1957.



BOTTOM: The Obiekt-268 prototype casemate was simplified for construction as compared with the final approved build drawings. Note also the removable rear plate for removing the ordnance.



An overhead view of the Obiekt-268, again taken during evaluation trials at NIIBT Kubinka, showing the highly angled casemate superstructure. Note the stereoscopic rangefinder.

was reduced, but the casemate side armour was increased to a basis of 100mm. Further, the frontal aspect of the casemate was as wide as the hull, with an armour basis of 187mm across all frontal aspects. It incorporated new design features for an SPG, including a commander's cupola with integrated rangefinder. The Obiekt-268 had a crew of five, four of whom were located within the casemate-structure fighting compartment, within which they had by Soviet standards considerable working space. The Obiekt-268 had an ammunition complement of 35 rounds.

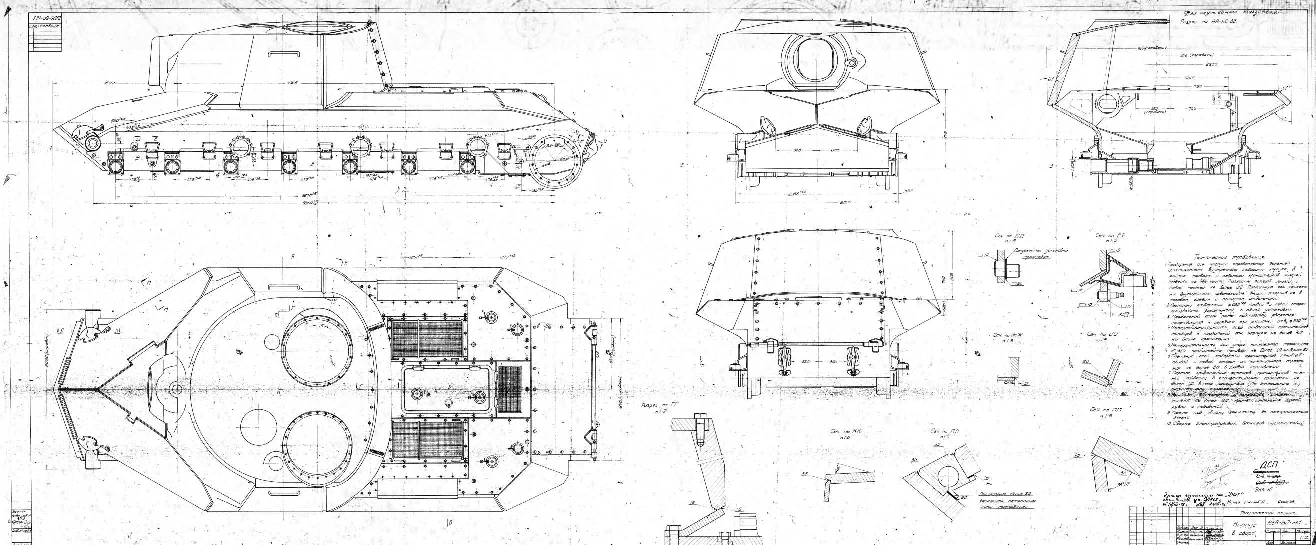
In March 1955 the decision was finally taken to build three prototypes of the Obiekt-268, the first to be completed by the end of March 1956, with the other two following in the summer of the same year. In parallel with this decision, work on the potential next-generation Obiekt-278 heavy tank was also given, and Chistyakov and his engineers were prioritized to work on this heavy tank development, to the detriment of the pace of work on the Obiekt-268.

The prototype 152mm M-64 armament was completed at Plant No. 172 in December 1955, and was a major improvement over the 152mm ML-20S with which the ISU-152 was armed in terms of muzzle velocity, range and rate of fire. Beyond the ballistic improvements, the M-64 featured a mechanical loader that greatly eased the task of the loader(s), and was fitted with a fume extractor on the barrel. Following plant trials, a 152mm M-64, serial No. 4, was sent to the Kirov plant in Leningrad for installation in the Obiekt-268 in February 1956.

Snagging work resulted in the first prototype Obiekt-268 being completed only in the autumn of 1956, which was further modified compared to the final revision of the concept drawings. To simplify production, the casemate roof and rear now used flat sheet steel plates rather than the more rounded form shown on the final concept drawings, since this required significant additional plate bending and forming. The casemate rear was also modified to allow installation and removal of the main armament.

Obiekt-268 Description

The Obiekt-268 had a forward mounted casemate construction gun mounting. The driver-mechanic sat on the vehicle centreline as with the T-10, with a



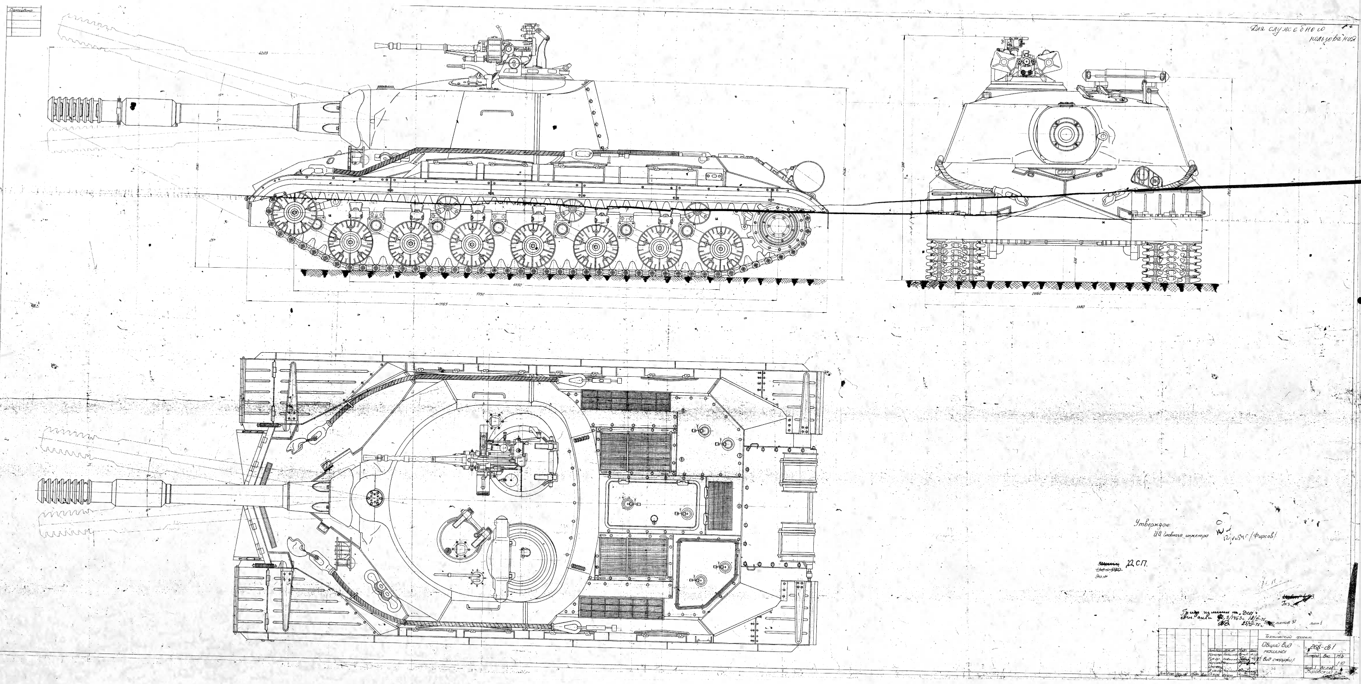
The approved Obiekt-268 armour layout drawings. The casemate was simplified for production.

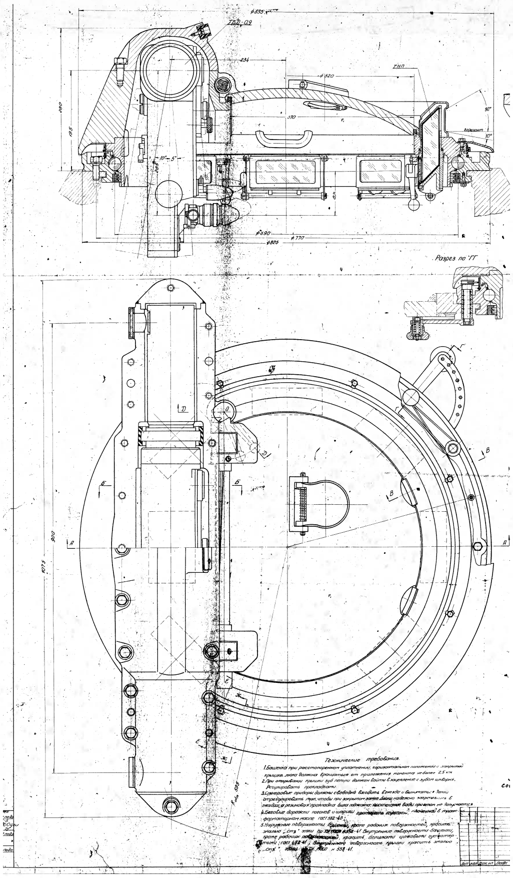
hatch above his position. The gunner sat in the casemate to the left of the gun, with the commander behind and the loader to the right. The commander had a cupola on the hull roof with a TKD-09 optical stereoscopic rangefinder.

The 152.4mm M-64 rifled tank gun built at Plant No. 172 was mounted in the front casemate, and in the final variant was fitted with a double baffle muzzle brake (rather than the planned multiple baffle type), with a bore evacuator located immediately behind. The gun had an elevation range of +15° to -5° and a total traverse of 12°.

For direct fire, a TSh-2A 'Sharik' sight was installed, and a panoramic ZiS-3 sight used when closed down. A stereoscopic rangefinder was mounted on the casemate roof.

The original June 1954 plant drawings for the Obiekt-268 show the more curved casemate structure and the intended fitment of a multiple baffle muzzle brake.





Plant drawing of the stereoscopic sight mounted on the Obiekt-268.

The ammunition was mechanically loaded, with the ammunition complement, consisting of 35 AP and HE-FRAG rounds, being located at the rear of the casemate fighting compartment. Direct fire range against a 2m target was 900m, with a maximum indirect fire range of 13,000m. The AP ammunition had a muzzle velocity of 760m/s, the HE-FRAG marginally less at 750m/s.

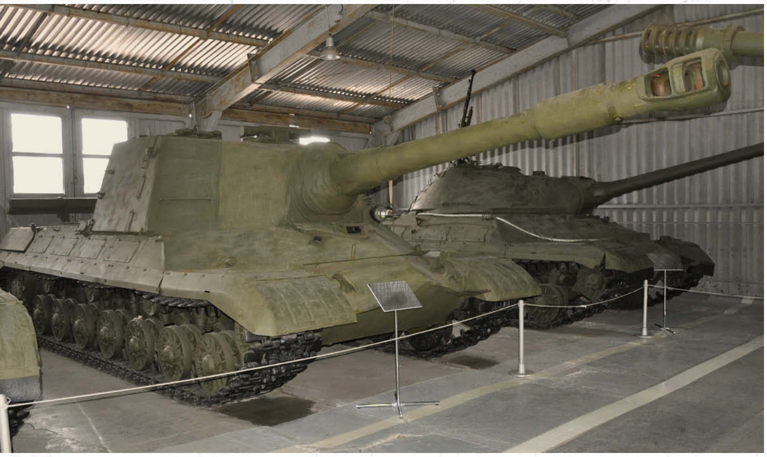
A 14.5mm KPVT heavy machine gun was mounted in a rotating ring mount above the gunner's hatch. Five hundred rounds of 14.5mm ammunition were carried on board. Two AK-47s were located within the vehicle, with a total of 1,500 rounds.

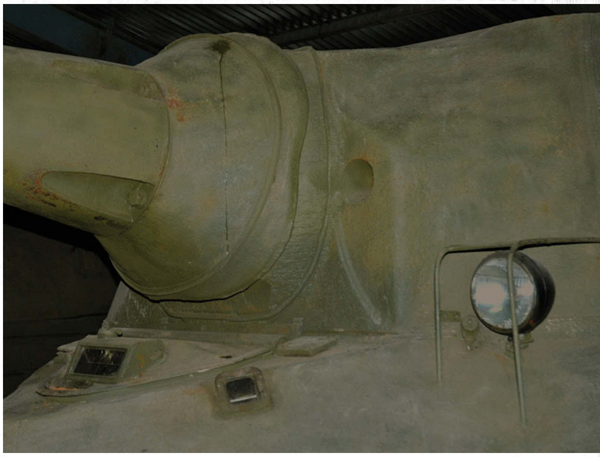
The hull of the Obiekt-268 was constructed of welded rolled steel homogeneous (RHA) medium hardness armour plate with a maximum thickness of 120mm. The hull construction was as for the standard T-10 heavy tank, but with an overall casemate height of 2.426m. The casemate had frontal armour of 187mm and was heavily sloped. The rear casemate armour could be unbolted for removal of the ordnance.

The engine used in the Obiekt-268 was the V-12-6, developing 750hp with liquid cooling. The transmission and running gear were as for the T-10. The Obiekt-268 had a combat weight of exactly 50 tonnes in line with prevailing heavy tank design weight limits, and a maximum speed of 48km/h.

Belated Development

The initial Obiekt-268 prototype, one of three planned for development testing, was built at LKZ in 1956. Plant testing of the Obiekt-268 prototype began in the autumn of 1956 and was completed in the spring of 1957, followed thereafter by acceptance trials at the NIIBT polygon at Kubinka. The overall results were deemed in accordance with the original design specifications and the superiority of the armament was acknowledged, while mobility was near identical to the T-10. The Obiekt-268 had powerful armament and excellent armour characteristics, and, rare in Soviet armour designs, good working space for the crew. The major drawback to its future development was, however, not technical, but calendar. Had it been fully developed perhaps five years earlier, it would almost certainly have entered series production, but by the summer of 1957 it had been overtaken by events.





ABOVE: The Obiekt-268 prototype survived and is today located at the Kubinka Tank Museum.

ABOVE RIGHT: The massive cast gun mantlet for the 152mm M-64 ordnance mounted on the Obiekt-268.

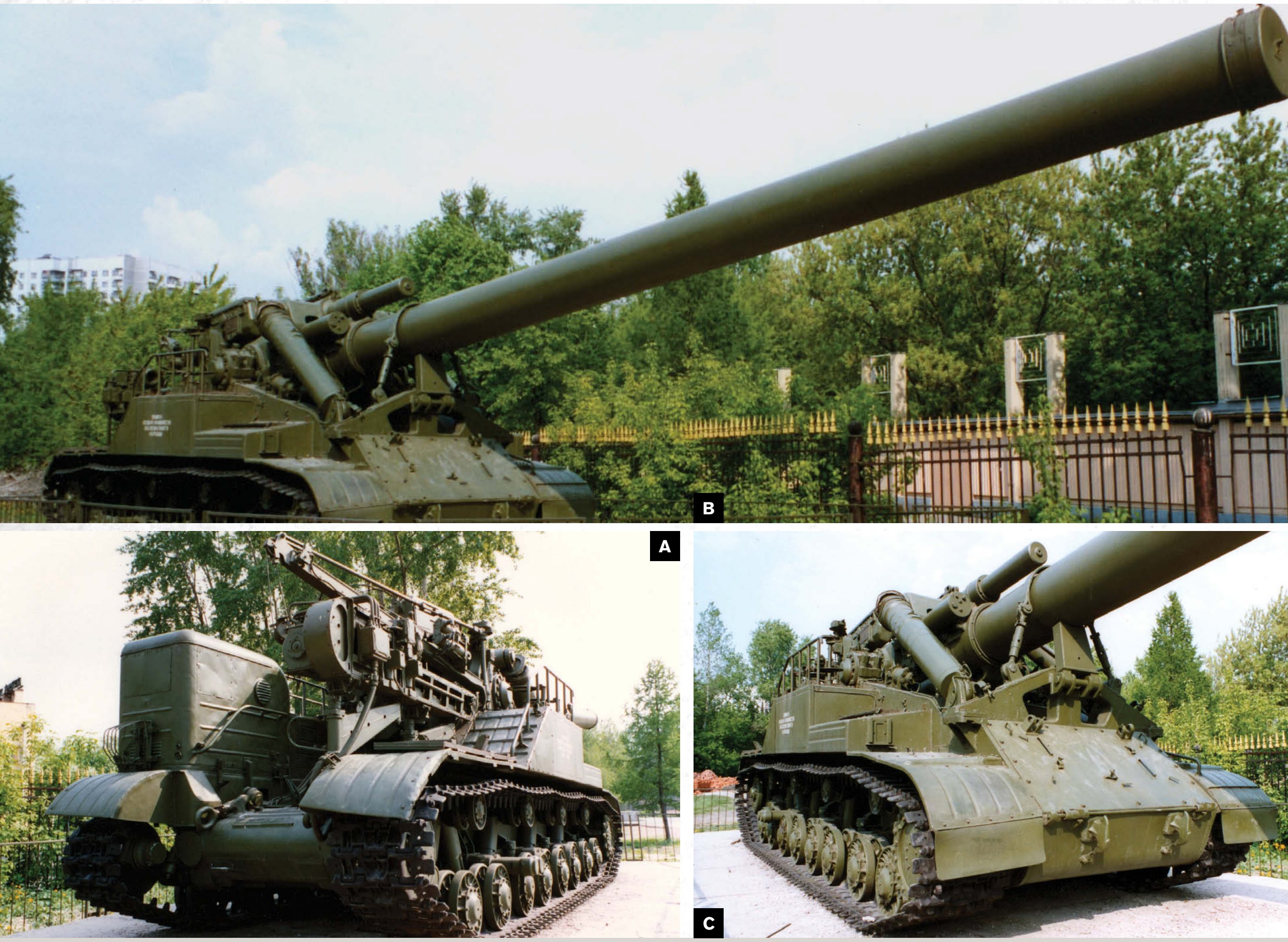
From early 1955, development work had begun on a new generation of heavy tanks, the Obiekt-277, 278, 279 and 770, with higher levels of armour protection that even the 152mm M-64 would have difficulty penetrating, and the Soviet Union fully expected that NATO countries would be similarly active in new tank developments. Meantime, in the mid 1950s, exactly when the Obiekt-268 was being developed for service, the decision was taken to modernize the obsolescent, but venerable and service proven ISU-152 to keep it in service for several more years. Furthermore, production of the T-10 heavy tank was (again in Soviet terms) proceeding at a leisurely pace at both LKZ and ChTZ, so there was a question as to whether further loading either plant with self-propelled variants in parallel with series heavy tank production was wise.

Plant No. 172, meanwhile, was busy with new tank gun developments for the proposed new generation of heavy tanks. Added to the other parallel factors affecting the Obiekt-268's development, the debut of the prototype Obiekt-268 also unfortunately coincided with the development from 1956 of the first generation of anti-tank guided rockets, known in Soviet terminology as PTURs and generically as ATGMs in the West. These were to be a game-changer in the arsenal of both the Soviet Union and its Cold War opponents. On 8 May 1957, the SM SSSR sanctioned the development of tanks and armoured vehicles armed with the new weapons. Though the Soviet Premier Khrushchev was later criticized for his rocket obsession, and it is fair to say that Soviet tank designers worked on such projects with less than outright enthusiasm, the fact remains that PTUR rocket systems were more compact than guns (if not always the rockets themselves). They were also easier to fire, guidable in flight, relatively cheap to manufacture and had large warheads with very powerful armour penetrating capability.

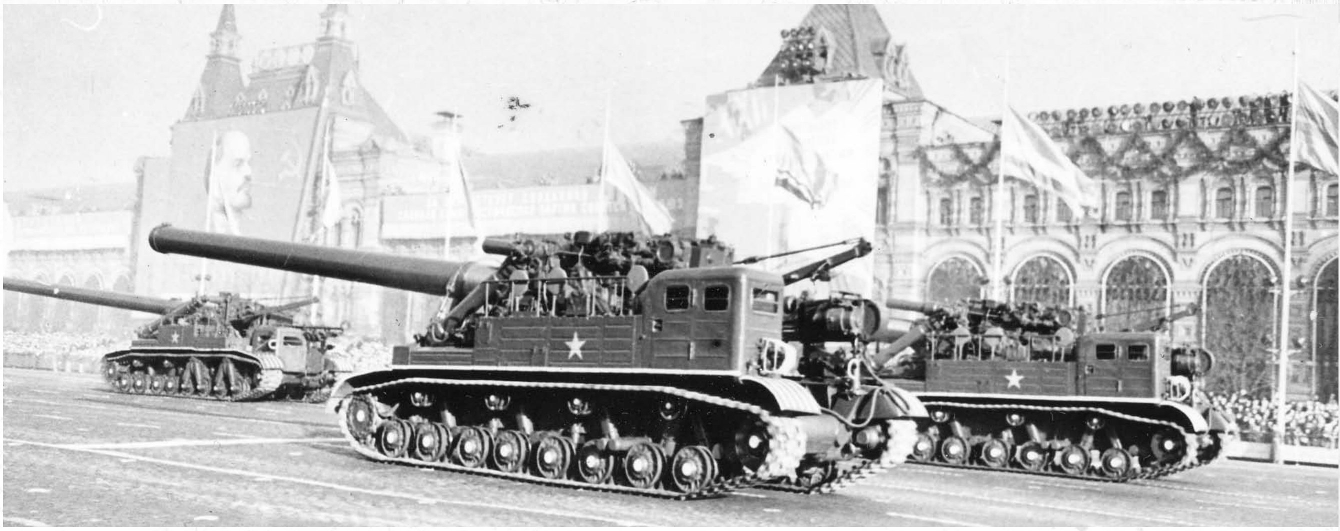
For these interlinked reasons, the Obiekt-268 prototype was not accepted for series production and became the last Soviet heavy SAU assault gun to be developed to prototype stage, though not ultimately accepted for production. The planned second and third prototypes were not built, and the original prototype was delivered to the NIIBT polygon museum at Kubinka, where it was recently restored to running order.

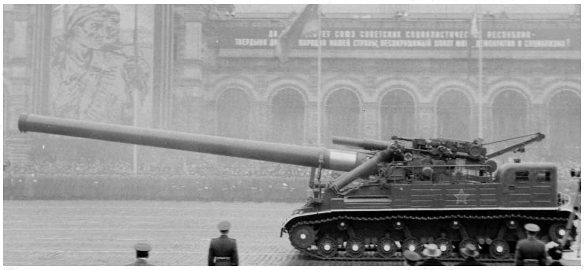
2A3 'KONDENSATOR' (OBIEKT-271) AND 2B1 'OKA' (OBIEKT-273) STRATEGIC NUCLEAR ARTILLERY SYSTEMS

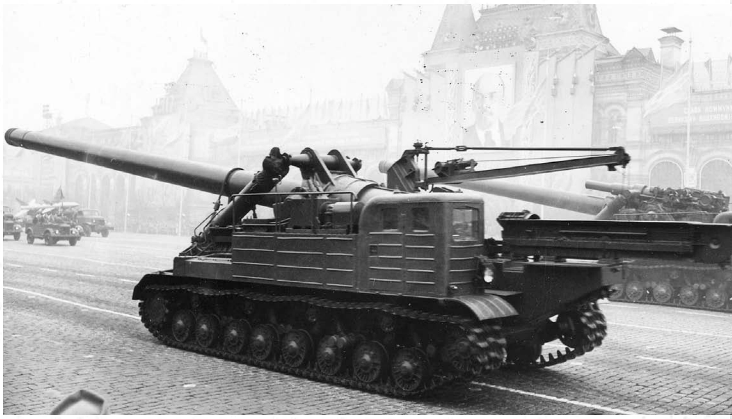
Prior to the creation of tactical battlefield rocket and missile nuclear delivery systems, the Soviet Union worked on the development of what were termed



(A) This 2A3 'Kondensator' was delivered to the Central Armed Forces Museum (CAFM) in Moscow in 1993, in pristine strategic storage condition. The prominent cab that best distinguishes the 2A3 is apparent. **(B)** The 2A3 was originally parked in an open location. It is now hemmed in by aircraft and other exhibits. **(C)** The massive 2A3 with its long barrel, powerful elevation systems and associated hydraulics was built largely from T-10 components at LKZ in Leningrad.







TOP: Obiekt-271 (2A3 'Kondensator') strategic gun-howitzers parade through Red Square followed by a 2B1 strategic mortar, 7 November 1962. This view shows the differing cab arrangements that readily distinguish the similar looking but very different vehicles.

ABOVE: An Obiekt-271 (2A3 'Kondensator') passing the cameras on Red Square. Soviet Premier Khrushchev, the missile enthusiast, was apparently not impressed.

RIGHT: A 2A3 'Kondensator' photographed on Red Square on 7 November 1957, the following S-75 'Dvina' SAM systems (better known in NATO as the SA-2 'Guideline') pointing to the future of weapons technology in the decade ahead.

'high power artillery systems', which was Soviet terminology for nuclear capable weapons. The first two of these strategic weapons developed and (in theory) fielded were the 2A3 'Kondensator' (Obiekt-271) gun system and the 2B1 'Oka' (Obiekt-273) mortar system.

T-10 components were used in the construction of the Obiekt-271 2A3 'Kondensator', a 406.4mm self-propelled gun-howitzer, and the Obiekt-273 2B1 'Oka' 420mm self-propelled mortar, both developed to deliver nuclear rounds to their target. Four of each were built and paraded through Red Square in 1957. However, due to their extremely heavy ammunition and consequent complex mechanical loading schemes, coupled with relatively short ranges and the rapid development of rocket technology, they were quickly replaced by operational-tactical rocket (OTR) systems such as the 'Filin', 'Mars' and 'Elbrus' (better known in the West by their generic FROG and SCUD nomenclature).

2A3 'Kondensator' (Obiekt-271)

The 2A3 'Kondensator' gun-howitzer was developed at Artillery TsKB-34 from 1954 as a long range weapon intended to deliver nuclear projectiles. Originally known as the SM-54, the GAU nomenclature 2A3 was used in a deliberate attempt at *maskirovka* (disguise), to maintain project secrecy, 2A3 also being the name of the 2A3 condensator-type electric lamp used in Soviet radio electronics.

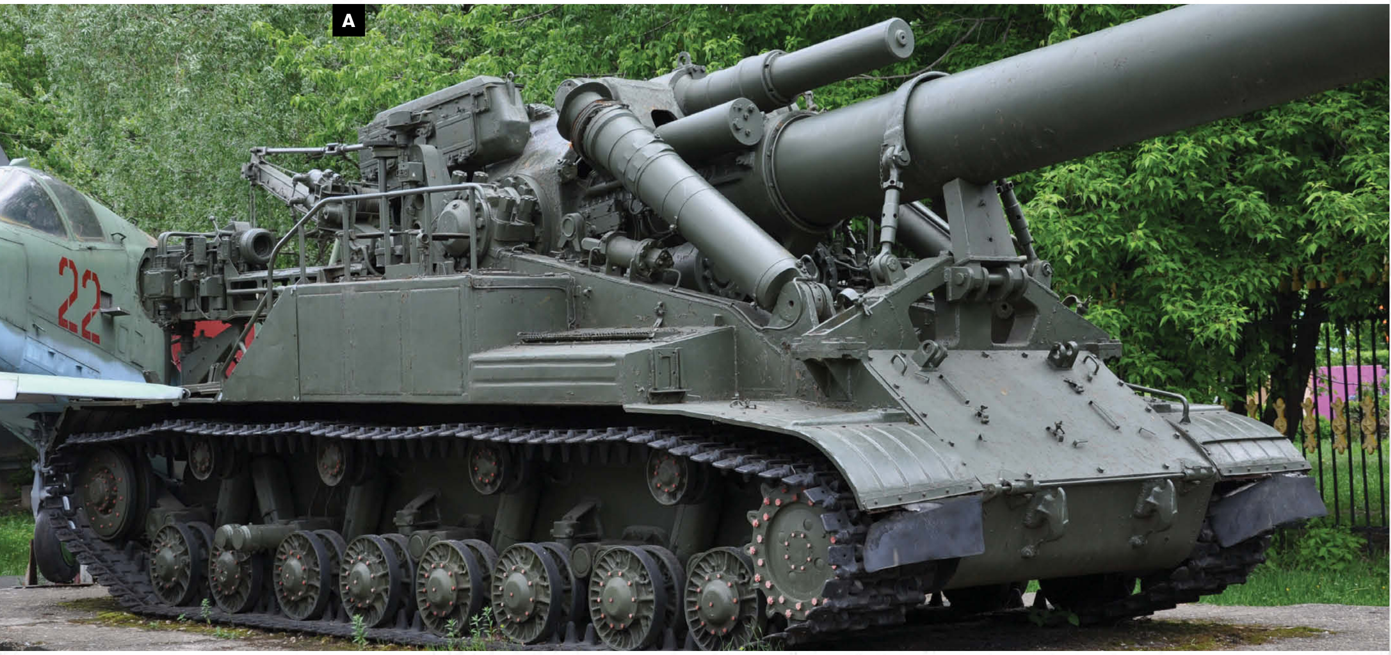
The 2A3 consisted of the 406.4mm SM-Eh124 gun barrel built by Plant No. 221 mounted on the LKZ developed Obiekt-271 tracked chassis, based on the chassis and running gear of the T-10 heavy tank with which it shared the power plant and mechanicals, with significant modifications to the running gear to accommodate the significant weapon recoil. The 406.4mm SM-54 gun-howitzer was built to deliver a nuclear 570kg projectile to a maximum range of 25.6km, not a great distance if considering Operativno-Taktichesaya Raketa – operational-tactical rocket (OTR) theatre level rocket developments in the same decade.

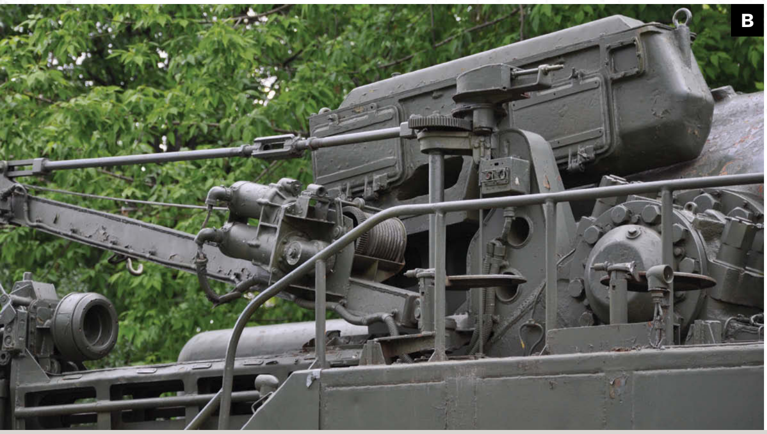
The gun was elevated by means of a hydraulic drive mechanism, with horizontal alignment by means of skidding the tracked chassis accordingly, which was all the accuracy required when delivering nuclear warheads.

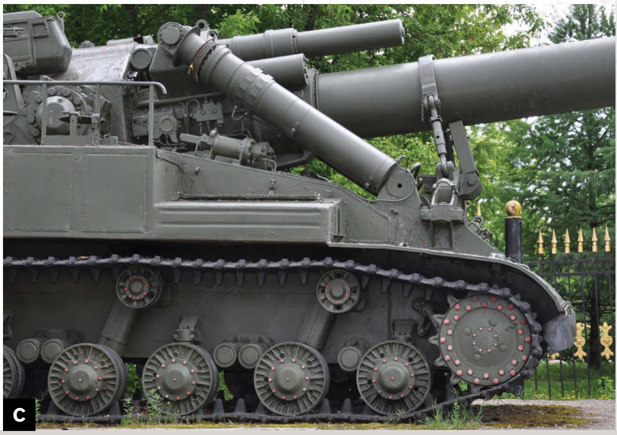
The first 406.4mm SM-54 gun developed at TsKB-34 was mated to a prototype 2A3 at the LKZ plant in Leningrad on 26 December 1956. The result was a massive 64 tonne self-propelled artillery vehicle some 20m in length and 5.75m in height (i.e. almost twice as high as it was wide) with a resultant centre of gravity as might be expected. It was operated by a seven man crew including the driver-mechanic. The 2A3 could move on made roads at 30km/h and had a rate of fire of one round every five minutes.

Military acceptance trials began in 1957, with firing trials being conducted at the Central Artillery Polygon near Leningrad. Testing showed up a number of defects, not least that on firing, the powerful weapon's massive recoil forces moved the entire chassis back several metres, with damage to the transmission and considerable stress cracking of the chassis becoming evident during trials.

A total of only four 406.4mm 2A3s were manufactured and from 1957 paraded together with the similar 2B1 'Oka' self-propelled mortar (SPM) at the 7 November Red Square parades in Moscow for the benefit of the Soviet high command and the foreign press. One individual who was not greatly impressed was Soviet Premier Nikita Khrushchev, the rocket enthusiast, who apparently remarked that such weapons were the result of unchecked military stupidity. Further development did not progress beyond production of the four pre-series examples, as the concurrent and rapid development of short and medium range missile systems quickly negated the requirement for such weapons.





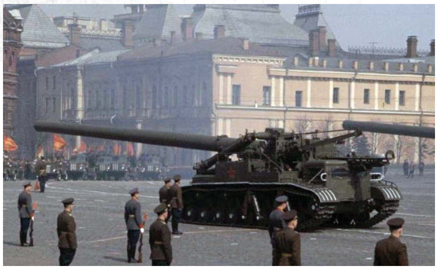


(A) The 2A3 is about as extreme a modification of the T-10 chassis as could be imagined, with a stretched platform, heavily modified suspension and ancillary systems required to move and operate the huge ordnance mounted on the chassis. **(B)** Reloading was by means of an on-board crane and power loading system, the shell weight being well beyond human ability.

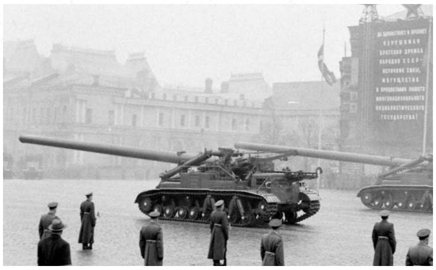
(C) The base chassis and suspension for the 2A3 'Kondensator' were derived from the T-10, but as is evident, the torsion bars are reinforced, and a sophisticated system of suspension locks added to provide an acceptable degree of firing stability. Interestingly the 2B1 'Oka' had the same requirements, but the design of the strengthened suspension differs significantly from the 2A3 'Kondensator'.

2B1 'Oka' (Obiekt-273)

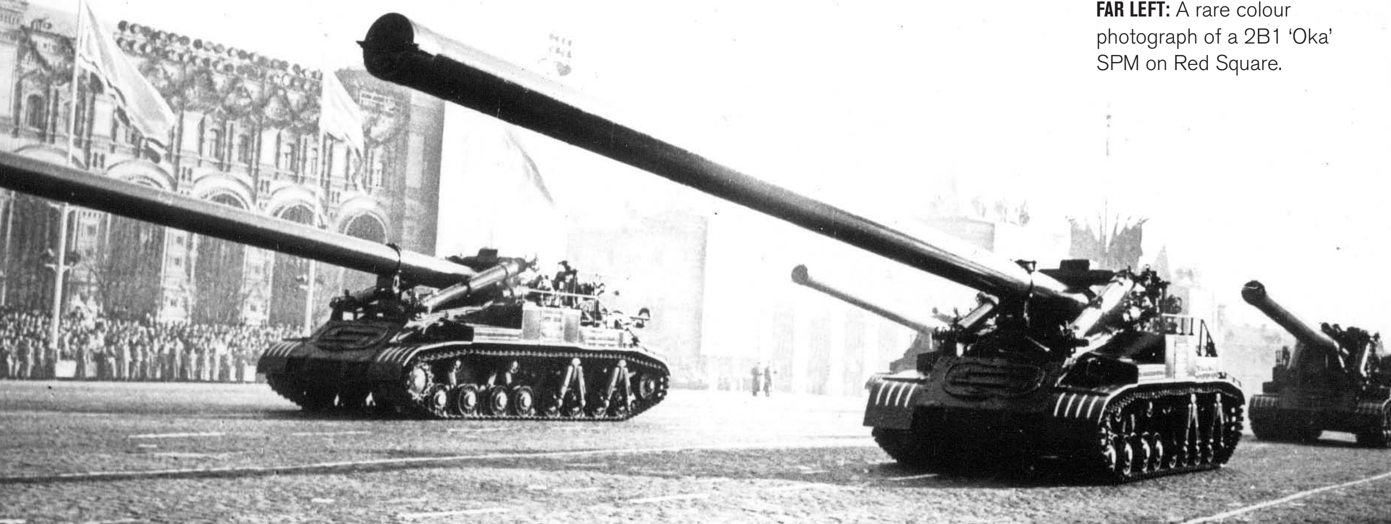
The 2B1 'Oka' 420mm self-propelled mortar was developed at Artillery TsKB-34 from 1954 concurrently with the 2A3 'Kondensator', and as with the 406.4mm SM-54 gun-howitzer ordnance of the 2A3 was intended for the long range delivery of nuclear projectiles. The 'Oka' mortar, originally known as the SM-58, was developed and built at the Barrikadny Plant in Stalingrad. The chassis for the GAU designated 2B1 'Oka' was, as with the 2A3 'Kondensator', also developed at LKZ, under the designation Obiekt-273 based on the chassis and mechanical components taken from the T-10M (Obiekt-272) heavy tank. Though superficially similar, there are significant differences between the two chassis. The most readily distinguishible feature is the cab arrangements. The 2A3 featured a large but narrow tandem cab arrangement mounted above the right front track guard, and the 2B1 featured a large full width cab mounted at the very front of the vehicle between the tracks. More fundamentally, the 2B1 mortar with its 20m long smoothbore barrel is devoid of any recoil mechanism, in contrast to the 2A3. Sources are conflated as regards the 'transformator' (transformer) nuclear mortar shell used with the 2B1 (itself another example of *maskirovka* or disguise). The shell weighed 650kg with a range of 25km, but some sources indicate a shell weight of 750kg and a range of up to 45km. The 2B1 had a rate of fire of one round every five minutes. Four 2B1 'Oka' tracked strategic artillery systems were built, matching exactly the number of 2A3 systems assembled at LKZ.



FAR LEFT: A rare colour photograph of a 2B1 'Oka' SPM on Red Square.

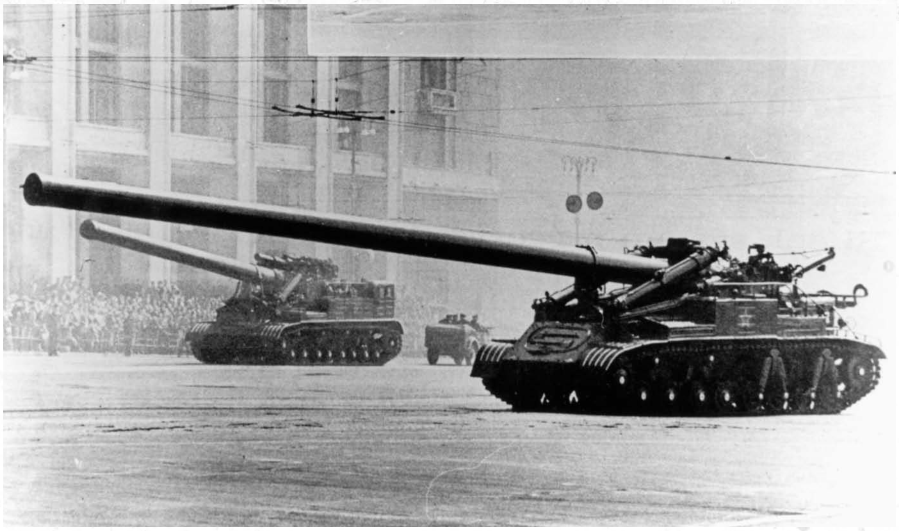


LEFT: This rear view of 2B1 'Oka' SPMs shows the extreme length of the barrel. The vehicles were apparently ungainly to drive and were somewhat limited in mobility beyond Red Square.

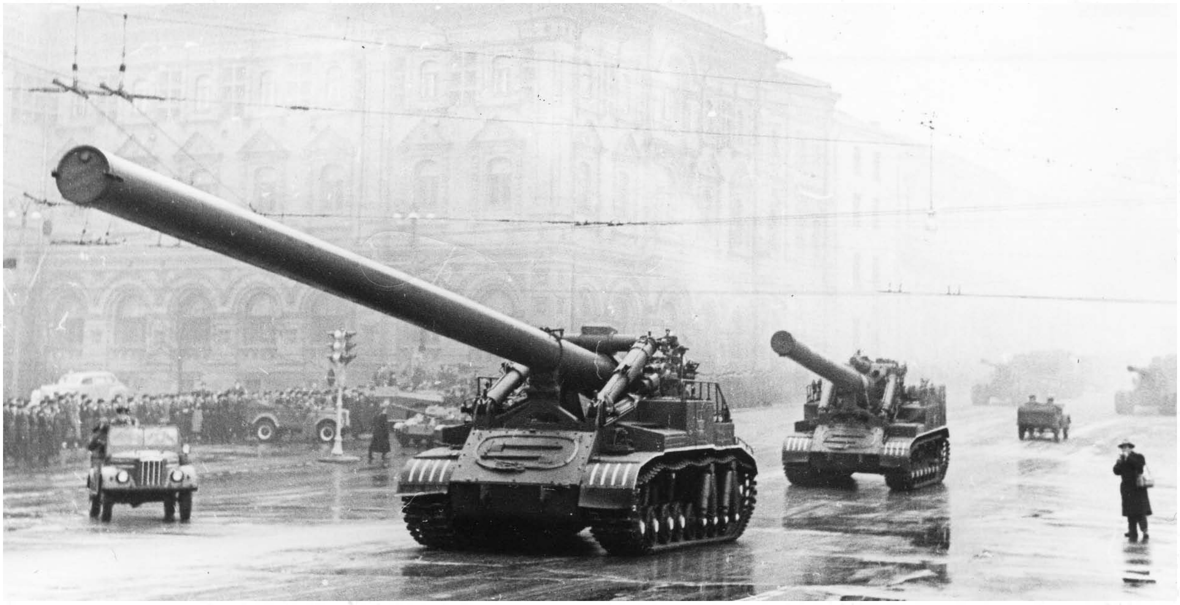


BOTTOM: A poor quality but rare photograph of two Obiekt-273 (2B1 'Oka') self-propelled mortars (SPMs) crossing Red Square during a late 1950s Red Square parade.

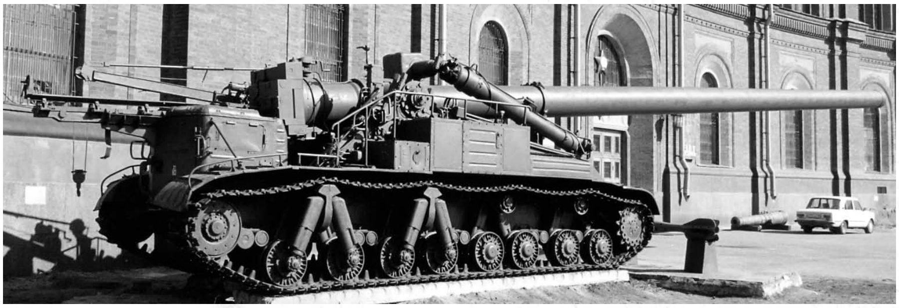
RIGHT: A 2B1 'Oka' (foreground) and 2A3 'Kondensator' (background) cross in front of the Hotel Moskva en route to Red Square. The great differences in the vehicles are evident in this view. (Tank Museum 2472/E3)

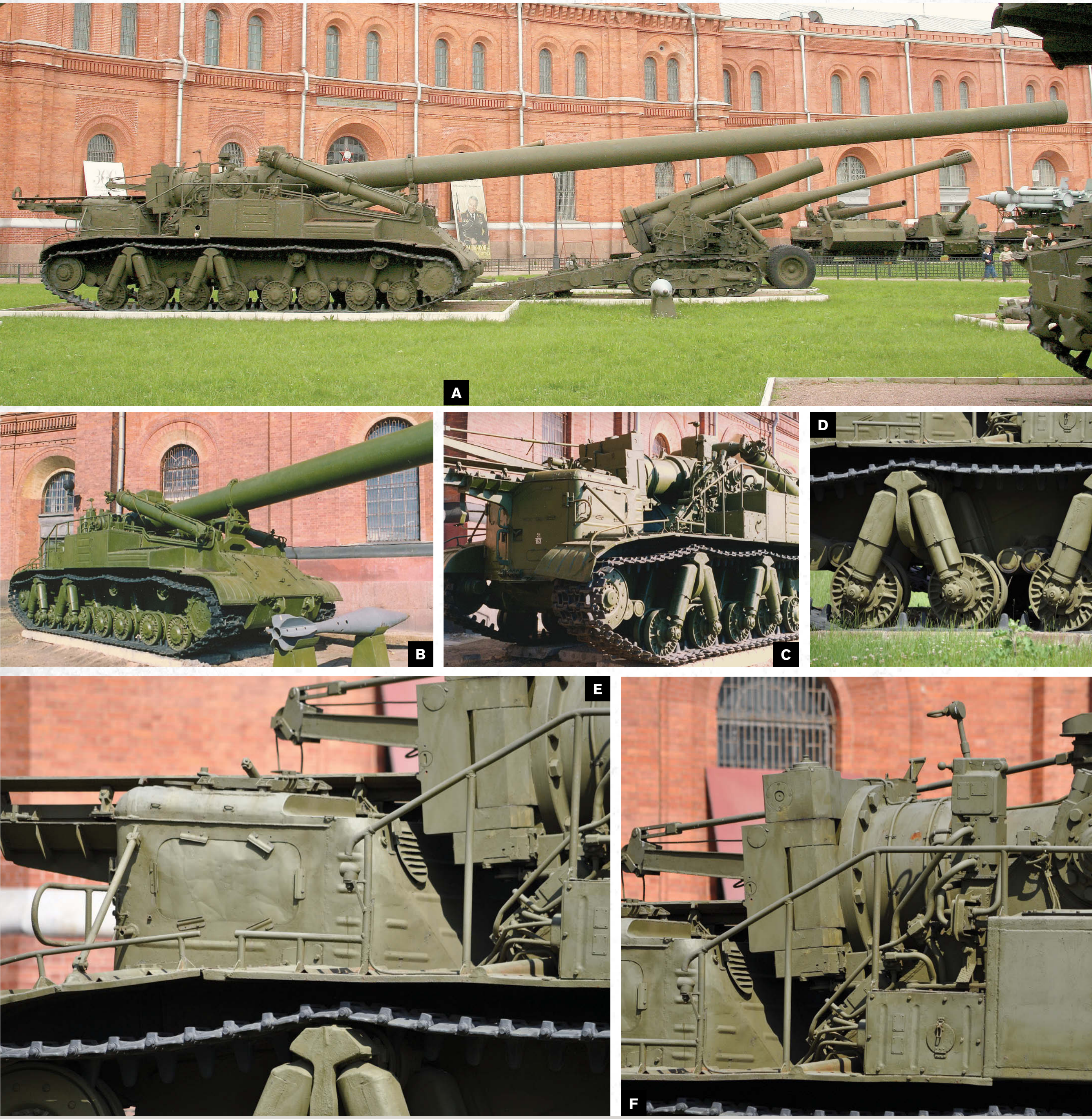


BELOW: A 2B1 'Oka' follows a 2A3 'Kondensator' down Gorky Street (now Tverskaya) en route to Red Square, 7 November 1960. The apparently random ASU-57 and BRDM are reserve vehicles parked near Red Square in the event of breakdown.



RIGHT: A 2B1 'Oka' appeared at the Artillery, Engineer and Communications Forces Museum (AECFM) in St Petersburg in the early 1990s, in pristine condition and straight from strategic storage.





(A) The immense barrel length is evident in this view of the 2B1 'Oka'. **(B)** The 2B1 'Oka' and its 680kg mortar bomb at the Artillery, Engineer and Communications Forces Museum in St Petersburg. **(C)** The front mounted full width cab of the 2B1 'Oka' with the huge mortar breech located immediately behind. **(D)** The suspension recoil locking mechanism on the 2B1 is even more substantial than on the 2A3 'Kondensator'. **(E)** The 2B1 'Oka' has a very different cab arrangement from the 2A3 'Kondensator'. **(F)** The massive horizontal breech of the ordnance is clearly seen in this view of the 2B1 'Oka'.

The 2B1 'Oka' and 2A3 'Kondensator' were paraded together through Red Square for the benefit of foreign military attachés and the international press. Leaving Khrushchev's personal opinion of the vehicles and conventional artillery in general aside, the reality was that by 1957 their time was past, overtaken by the rapid parallel progress of rocket artillery systems in the same decade.

OBIEKT-272 (T-10M WITH 'FALANGA' ATGM) (1960)

With experimental work on the 140mm 'Rezets' and 130mm M-65 and associated sub-calibre ammunition not having progressed to production stage, work began on alternative ways of prolonging the service life of the T-10 series. An MO SSSR order dated 19 January 1961 sanctioned development work on the T-10M Obiekt-272, which actually referred to future variants rather than the base T-10M tank design. By 5 April ChTZ had presented two parallel design concepts. The first concentrated on significant changes, reducing the combat weight to around 45 tonnes, not least by incorporating new titanium components. The second considered armament in the form of guided anti-tank rockets, abbreviated in Russian as 'PTUR'. The first option was rejected as it amounted to developing a new tank, while the second was rejected as first generation 'PTUR' rocket systems were daylight-only operation, hence main armament would still be required for *kruglosutichniy* (round the clock) operation. Developments therefore moved on to the mounting of PTUR systems as complementary armament for long range tank engagement, with the rocket systems being developed at the KBM in Kolomna under the director and chief designer B. I. Shavirin.

The T-10M was experimentally fitted with the 'Falanga' ATGM rocket, launched from a substantially engineered rail mounting located on the front of the turret above the gun mantlet. The system, as more usually associated with the BRDM armoured car, was built and tested on an Obiekt-272 prototype, but did not progress beyond trials stage. Two T-10M tanks (No. 5905B07 and No. 580B02) underwent 858km of testing in October–December 1960 mounting the 'Falanga' system as a precursor to potential serial deployment on the Obiekt-287, including firing trials at the Gorokhovets polygon.

Being mounted independently of the gun barrel, the system did not interfere with the main armament, but was a large and unwieldy rocket installation.

OBIEKT-272 (T-10M WITH 'SKORPION' ATGM) (1961)

At the beginning of 1961, a design group at the KBM missile design bureau in Kolomna under the direction of S. P. Nepobedimy worked together with designers at OKBT LKZ under the direction of Yuri M. Mironenko to develop additional long range anti-tank missile systems to complement the main armament. Using Obiekt-272 serial No. 5505A001 as a test mule, they installed a 'Skorpion' ATGM wire guided rocket attached on a launch rail above the main gun barrel, approximately 1.5m from the mantlet. Guidance was via the conventional gun sights, with a TPV-51 vision device removed to allow guidance cable access.

The Obiekt-272 prototype with its additional 'Skorpion' ATGM armament was tested over 250km of terrain, with the system fired at rest and on the move at target ranges of 1.5km, though the guidance cable drum had a capacity of 2.5km. The trials concluded that the rocket, designed to fire over ranges of 600–3,000m, was effective as additional armament, its cumulative warhead defeating 300mm of vertical armour or 150mm at 60°; however, the large and heavy rocket (120mm in diameter, 1.055m long and 15kg weight) was difficult to target accurately. It also interfered with the gun stabilization system and thereby gun laying of the main armament. Efforts therefore moved onto the use of the smaller 9K11 'Malyutka' ATGM system with its more compact 9M14 rocket, on which the KBM bureau had been simultaneously working in parallel with the 'Skorpion' system. The 'Skorpion' ATGM system was demounted from its Obiekt-272 serial No. 5505A001 test-bed vehicle and the tank chassis sent to LKZ where work would continue using the 9K11 and its smaller 'Malyutka' rockets.

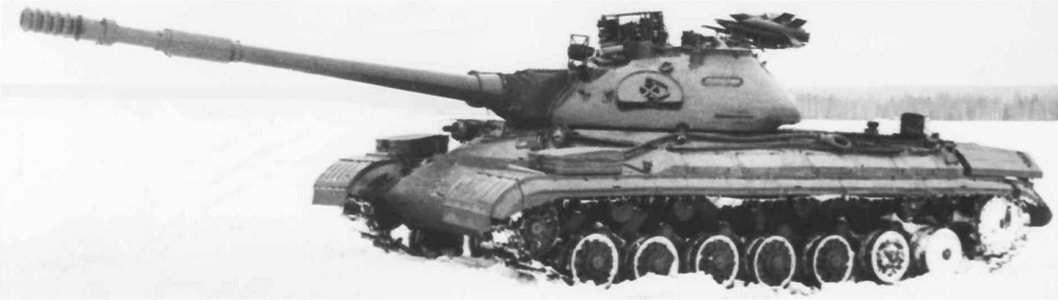
OBIEKT-272M (T-10M WITH 9M14 PTRK 9K11 'MALYUTKA' ATGM) (1962)

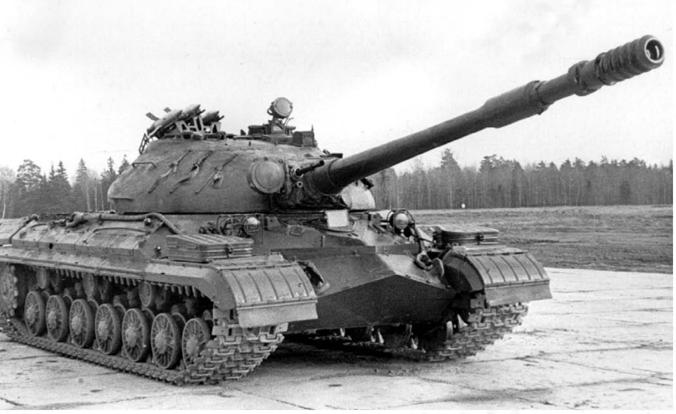
In 1962 Nikita S. Khrushchev, First Secretary of the CPSU and premier of the USSR, dictated that as many weapons as possible should be based on missile technology. This included tank armament, and all tank design bureaus felt obliged to add ATGM capability to their existing tank designs. Development of such rocket armed systems was by this time well advanced, and the TTKh technical project for a follow-on T-10 armed with supplementary rockets had been well defined in the first six months of 1961, based on all the earlier work with 'Skorpion' and 'Falanga' systems. The new tank development would receive the plant index Obiekt-272M.

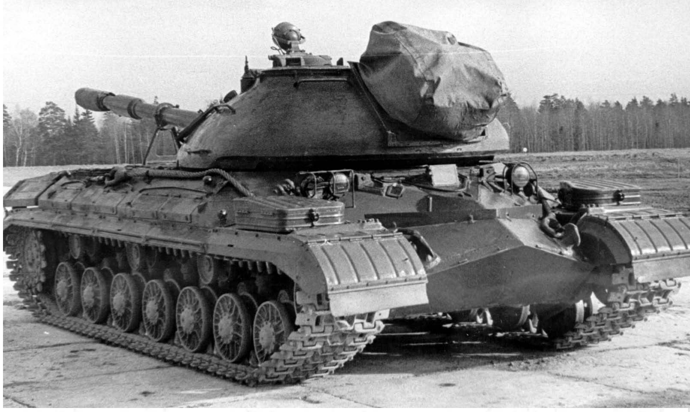
The Obiekt-272M was developed in 1962 at the KB (OKBT) of LKZ under the direction of Iosef Kotin. The Obiekt-272M consisted of a three rail launcher for the 9M14 'Malyutka' (NATO: AT-3 'Sagger') ATGM mounted on the turret rear of the T-10M heavy tank, in order to provide the tank with extended range anti-tank capability against armoured targets at ranges of 2,500–3,000m. The same system was experimentally mounted on several other Soviet tank types, including the T-54, T-55, T-62 and PT-76, prototypes of which were all tested at the Kubinka polygon.

RIGHT: The Obiekt-272M during plant trials, 1962.

BELOW: The Obiekt-272M at the NIIBT polygon, Kubinka. The 9M14 'Malyutka' rockets are just visible at the rear of the turret.



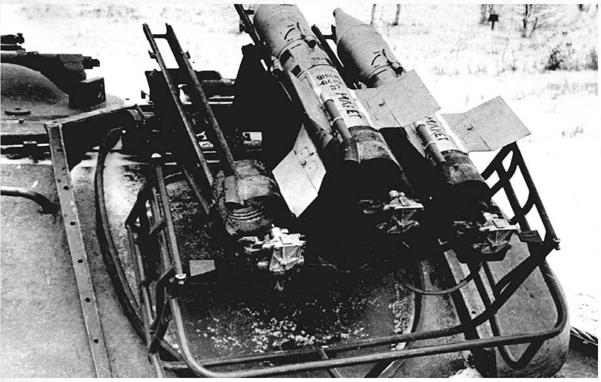


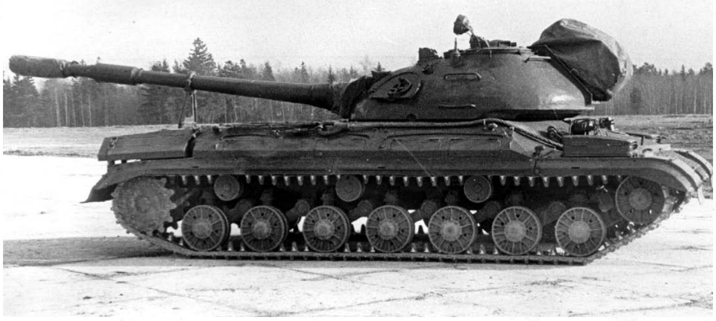


ABOVE RIGHT: A nice side view of the Obiekt-272M with its covered launcher and three 'Malyutka' rockets.

The Soviet 9K11 'Malyutka' (NATO: AT-3 'Sagger') ATGM was developed from 1957, and was a game-changing weapon. The 9M14 rocket, with a range of 3–4km, was particularly small and compact compared with earlier generation anti-tank rockets, with its folding wings allowing the rocket to be stored within the confines of armoured vehicles. The system was mounted on the BRDM and later BRDM-2 armoured cars, giving them the capability to destroy tanks of all types in addition to light armour, and was also developed in a hand held 'suitcase' variant that later proved particularly effective during the Arab–Israeli Yom Kippur War in 1973. The relatively diminutive size of the rocket also allowed tanks and armoured vehicles to be fitted with the rocket system, with the later BMP and airborne forces BMD being fitted with launch rails over the main armament for the systems.

A single prototype Obiekt-272M (No. 103B007) was built at LKZ in the second half of 1961, and in October that year was tested at the NIIBT polygon at Kubinka. It was then returned to LKZ and the original design modified, with two new prototypes being built for further evaluation. In the first months of 1962, the original prototype continued to be tested at the plant as the two new prototypes were being built. However, a decision taken by GBTU in March 1962 to narrow the scope of developments based on the





ABOVE LEFT: The launch rail with two of the three 9M14 'Malyutka' rockets mounted.

ABOVE: The Obiekt-272M during proving trials, with the 'Malyutka' launch rails covered in a canvas tarpaulin.

T-10 chassis resulted in the two additional prototypes not being completed and development continuing using only the original prototype, mounting either the 9M14 'Malyutka' or the 9M12 'Ovod' ATGMs.

The 9M14 'Malyutka' launcher could be elevated from -7° to +12° by means of an electric drive mechanism. The gunner-operator used the tank's T2S-29-14 main gun sight for aiming and controlled the rockets in flight by means of a 9S429 joystick control unit. The 9M14 rockets had a minimum acquisition range of 500m and a maximum range of 3,000m, with the ability to penetrate 400mm of vertical RHA armour plate.

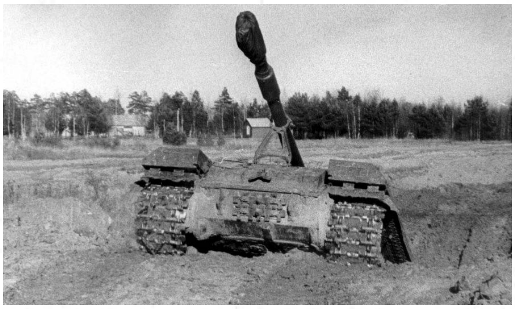
The Obiekt-272M carried a total of six 9M14 'Malyutka' missiles; three mounted on the frame launcher on the turret rear, with a further three missiles located within the tank, where they did not displace any ammunition for the main armament.

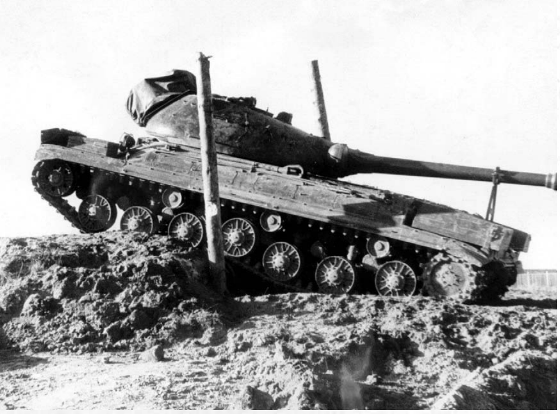
Work on the original but modified prototype continued at LKZ in Leningrad in co-operation with the KBM missile design bureau in Kolomna, with the prototype undergoing further trials at Kubinka from June to November 1962. The prolonged trials reflect the complex nature of the new rocket weapons and their control systems relative to the old standard gun armament, and many further detail improvements had been engineered at both LKZ and KBM during the months the prototype was located at Kubinka. The modifications were duly incorporated into the prototype on its return to LKZ, and after further plant testing the prototype was again sent to the NIIBT polygon at Kubinka, where it was subsequently tested from 7 February to 25 April 1963 in collaboration with engineers from KBM. Another cycle of return to LKZ and re-work, including mounting a strengthened and now amortized launcher complex, was followed by Obiekt-272M prototype No. 103B007 being again sent to the NIIBT polygon at Kubinka. In April 1964 the modified system was successfully tested at Kubinka, including trials conducted with the tank moving at 12–16km/h.

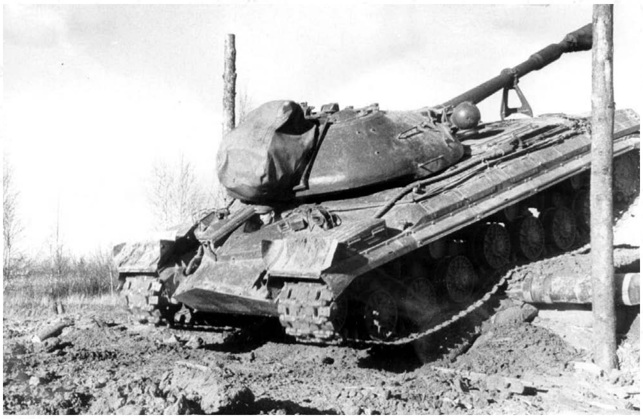
Some months later, in October 1964, a full set of GBTU testing began at Kubinka, including moving and firing trials with the base gun and rocket armament. Further testing of the Obiekt-272M, experimentally fitted with its three-rail launcher for the 9K11 'Malyutka' ATGM missile on the turret rear, was latterly conducted at Kubinka in November–December 1964 alongside similarly modified T-54, T-55 and PT-76 prototypes with a view to rolling out the 9K11 as a standard 'PTUR' for providing long range armour penetration capability across all classes of Soviet tank.

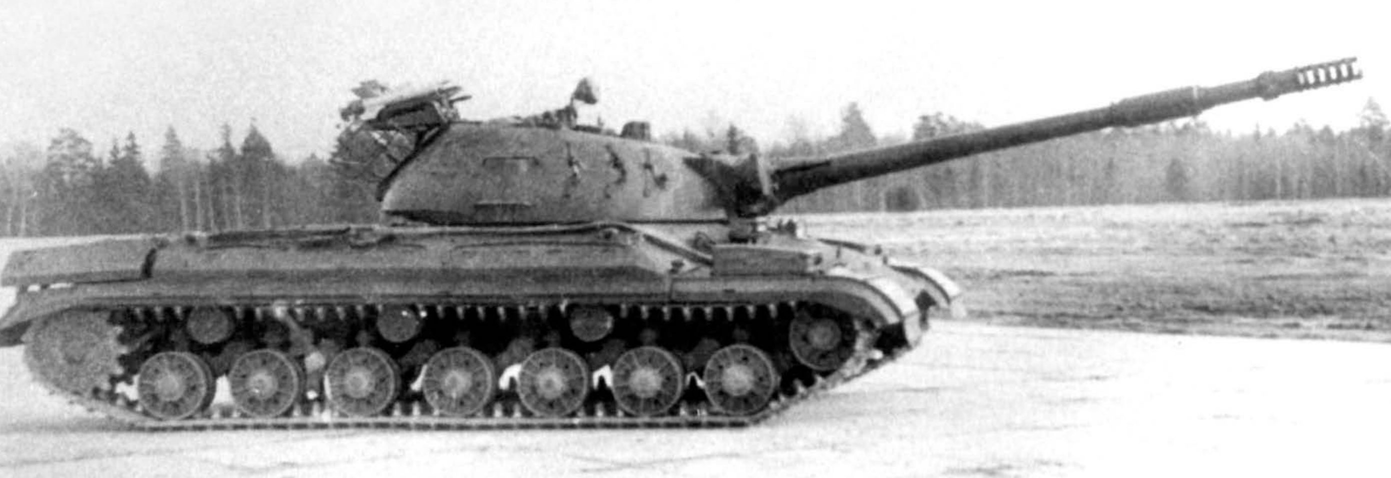
The Obiekt-272M trials, which had included 1,500km of travel, nine test launches of 9M14 rockets, and six rounds fired from the main armament, resulted in a recommendation to approve the Obiekt-272M for mounting as

BELOW: The Obiekt-272M during mobility trials at the NIIBT polygon, Kubinka, 1964.
RIGHT: The Obiekt-272M during the same trials, negotiating a particularly steep set of obstacles.
BELOW RIGHT: The same tank seconds later. Note the track guards are folded back to avoid damage. The driver-mechanic is wearing a flat cap rather than a helmet, suggesting a plant driver.
BOTTOM: This view of the Obiekt-272M during evaluation trials also shows the significant differences in overall length, suspension, turret and armament compared with the earlier IS-3M.









secondary armament on the T-10M, for the provision of long range anti-tank capability to a range of 2–3km. Further, a pre-series batch of 10–15 T-10M Obiekt-272M tanks were to be built in 1965 for long-term service evaluation with the Soviet Army prior to making a decision with regard to widespread adoption of the 9K11 system as secondary armament.

The Obiekt-272M was ultimately not taken into service with the Soviet Army, for several reasons. It was not practical to attempt to fire the 9M14 'Malyutka' missiles on the move, and bringing the tank to a halt to fire the missiles would also make the T-10M vulnerable. The tubular steel construction mounting, containing its three 9M14 'Malyutka' missiles, was considered vulnerable to small arms fire and shrapnel. There were two other overriding reasons why the Obiekt-272M was not developed further. LKZ had already begun work on a new 'rocket tank' with 100 per cent rocket armament based on the Kharkov built Obiekt-432 MBT chassis. The Obiekt-432, forerunner to the T-64 MBT, was also the future, and improving armament and armour of the new Main Battle Tank also had an indirect effect on the Obiekt-272M, as the decision was taken to remove the T-10M from series production, and with that to close down the entire Soviet heavy tank programme.

A small pre-series batch of 30 such 9K11 ATGM rocket based modifications was built and mounted on the T-62 MBT chassis for trials with the Soviet Army, but all further work on the T-10M chassis was curtailed for the reasons noted.

The Obiekt-272M prototype chassis was later fitted with a modified experimental gun recoil system, which was tested on a tank originally used for testing the 9M14 'Malyutka' ATGM rockets.

OBIEKT-277 HEAVY TANK

A further development of the T-10 was the Obiekt-277, developed at the Leningrad KB (OKBT) at LKZ in 1956–58 under the direction of Iosef Kotin as a potential next-generation follow-on for the T-10 heavy tank, utilizing components from the IS-7 prototype and the current T-10 tank series. The Obiekt-277 was built using the same TTTs from which the Obiekt-730 (the then future T-10) had been developed at ChKZ in the early 1950s, but with a significantly different interpretation and outcome.

The Obiekt-277 was even larger and heavier than the T-10, with a lengthened hull mounted on eight road wheels, armed with the 130mm M-65 gun and with a 14.5mm KPVT as co-axial armament. The ammunition complement was limited to 26 rounds. The 55 tonne tank was powered by a naval derived M-850 V-12 diesel engine developing 1090hp.

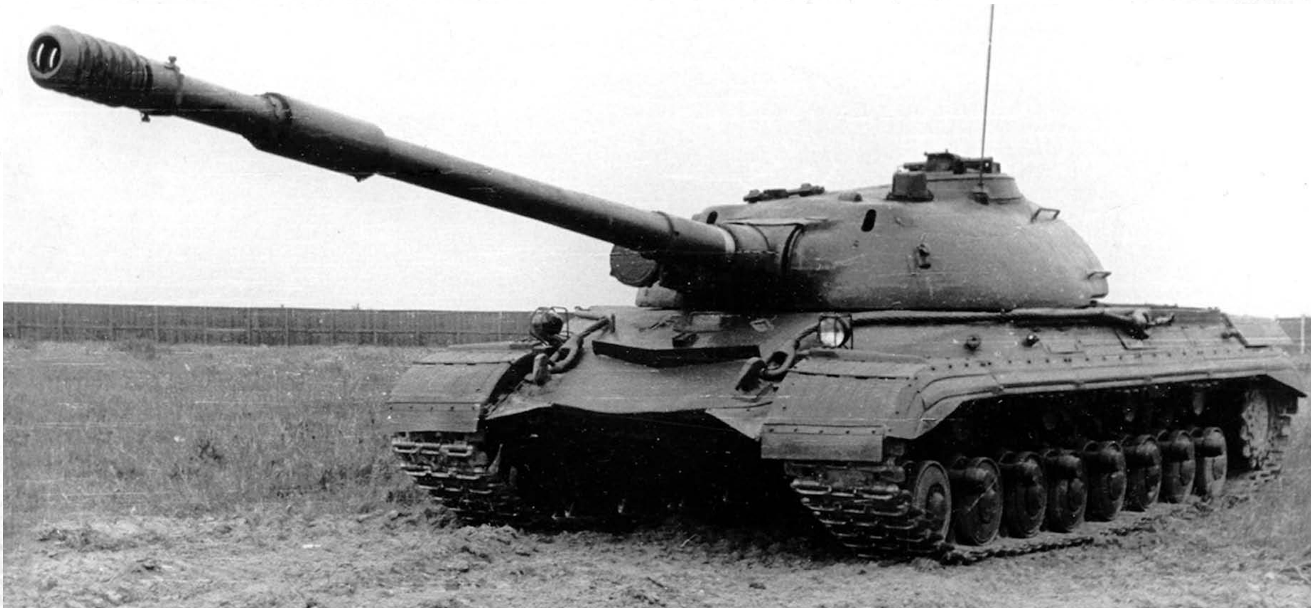
Two prototypes were built between 1958 and 1959, the first prototype being ready by December 1958 and tested from 7 January 1959 to 26 February 1960. An additional set of hull and turret armour was built for firing trials to determine armour integrity.

Trials showed the need for much remedial work before the tank could be accepted for production, which, combined with the military and political changes in the wind by the end of the 1950s with regard to the future of heavy tanks, led to the Obiekt-277 and its M-850 diesel engine installation being cancelled by resolution of the SM SSSR dated 19 July 1960.

Obiekt-277 Description

The Obiekt-277 had a classical classis layout, with a crew of four. The armament consisted of a 130mm M-65 gun with a horizontal sliding breech, multiple baffle muzzle brake and bore evacuator, 'Groza' two-axis gun stabilization system, and a TPDS stereoscopic rangefinder built into the turret, which during trials was replaced with a TPD-2S sight. A TPN-1 night sight was provided for night firing. Elevation was -5° to 16° with electro-hydraulic turret traverse and manual override. The Obiekt-277 had a direct fire range of 1,230m against a 2m target. In 1959 a sub-calibre APFSDS round was made available for the 130mm M-65, with a direct fire range of 2,150m. The Obiekt-277 was provided with a mechanically operated ammunition carousel located in the lower turret for the separate loading two-piece ammunition, with 15 projectiles stored vertically and 15 cartridges stored horizontally. The ammunition complement was a total of 26–35 rounds. The AP rounds weighed 30.7kg, hence the requirement for an electro-mechanical autoloader.

A major issue with the tank was the length of the gun barrel. Soviet commanders were wary of guns that projected far ahead of the tank for fear



The Obiekt-277 during evaluation trials. The Obiekt-277 was developed as a potential replacement for the T-10 series. It featured a lengthened hull, highly modified suspension, new M-850 engine developing 1,090hp, a new enlarged turret and a 130mm M-65 gun. Despite the additional armour and armament, the new engine provided the 55 tonne combat weight tank with a matching maximum speed of 55km/h.

that in combat the armament would strike the ground on rough terrain and thus incapacitate the main armament, or worse, damage the gun to the point of requiring depot level maintenance not possible in combat. There was a precedent to this, in that during trials of the SU-100 self-propelled gun there were problems with the gun barrel grounding, and SU-100 driver-mechanics had to be particularly careful in operating the vehicle. With the gun forward, the Obiekt-277 had a total length of 11.78m, so that the driver-mechanic was required to drive with considerable care, reminiscent of issues encountered with the earlier SU-100.

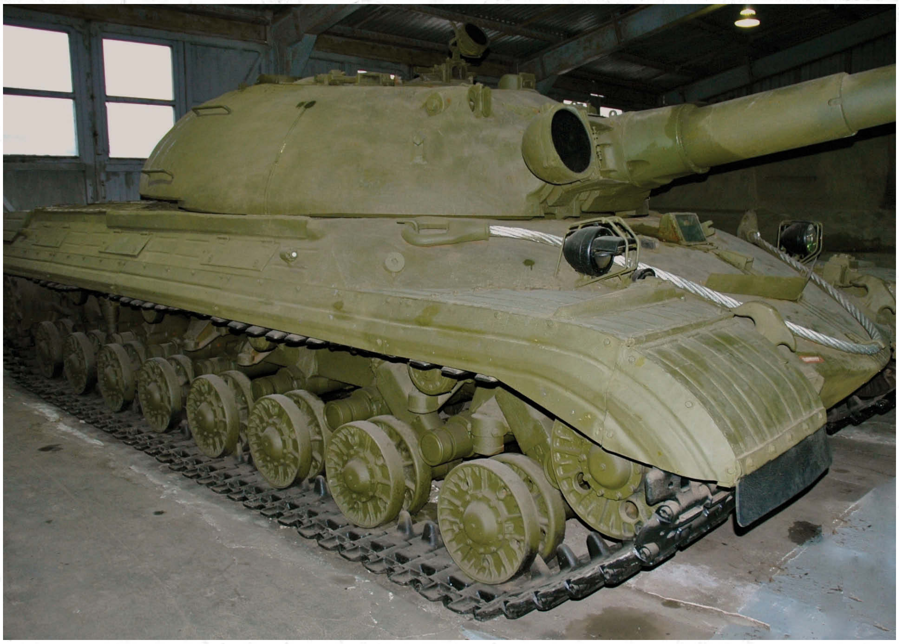
With a view to operating in a nuclear environment, a PAZ nuclear overpressure system was installed, as was a full set of night vision equipment for the turret crew and the driver-mechanic.

The 14.5mm KPVT co-axial machine guns could be used as a ranging weapon for the main armament.

The glacis armour of the Obiekt-277 provided protection against 122mm rounds and 90mm cumulative rounds, although testing was not completed before the project was cancelled. Unlike the rolled homogeneous armour plate glacis of the T-10 series, the Obiekt-277 used cast glacis armour.

The Obiekt-277 had a maximum glacis armour basis of 140mm, set at 60–70° from vertical, with the lower glacis correspondingly 153mm at 50–55° from vertical. The turret had maximum frontal armour of 290mm, with a minimum of 139mm, set at 30–60° from vertical, with maximum turret side armour of 236mm and a minimum of 138mm set at 30–55° from vertical. All in all, the Obiekt-277 was a remarkably strongly armoured tank, but that armour came at a cost relative to prescribed limits on overall heavy tank combat weight.

The Obiekt-277 was powered by an M-850 V-12 liquid cooled diesel engine developing 1090hp, created by the KB of the Zvezda Plant in Leningrad on the basis of the M-50 diesel engine used in Soviet torpedo boats, and in turn developed from the AN-1 aircraft engine. The engine was started by an S-3 electric starter developing 25hp or by means of two 5 litre compressed air cylinders. A pre-heater was provided for cold temperature starting. Fuel was 820 litres internally under armour and 250 litres externally, giving the tank a total road range of 300km with its maximum road speed of 55km/h. It used two-stage air cleaners, stage one being a ‘cyclone’ and stage two being a cassette-type oil bath cleaner. The engine and transmission were mounted as a single unit, with an 8-speed planetary transmission and ‘ZK’-type steering mechanism taken from the T-10. The final drives were provided with hydraulically assisted disc brakes. An MTO automatic fire suppression system was installed, as was a TDA-type fuel injection smoke laying system.



One of the two original Obiekt-277 prototypes, now preserved at Kubinka. Though resembling the T-10, the Obiekt-277 was a complete re-design, longer, with new armament in a new and larger turret, significantly strengthened torsion bar suspension, and a new engine to accommodate the increased 55 tonne combat weight.

The tank was provided with a lengthened hull supported on eight road wheels. The torsion bar suspension was strengthened by the use of additional hydraulic recuperators and hydraulic shock absorbers on the first, second and eighth wheel stations, with bounce stops on all but the last wheel station. The tank used four return rollers. The tracks were OMSh type with internal amortization. Ground pressure was 0.73kg/cm^2. Communications consisted of an R-113 radio and R-120 TPU laryngaphone. The tank was fitted with an SG-10 generator.

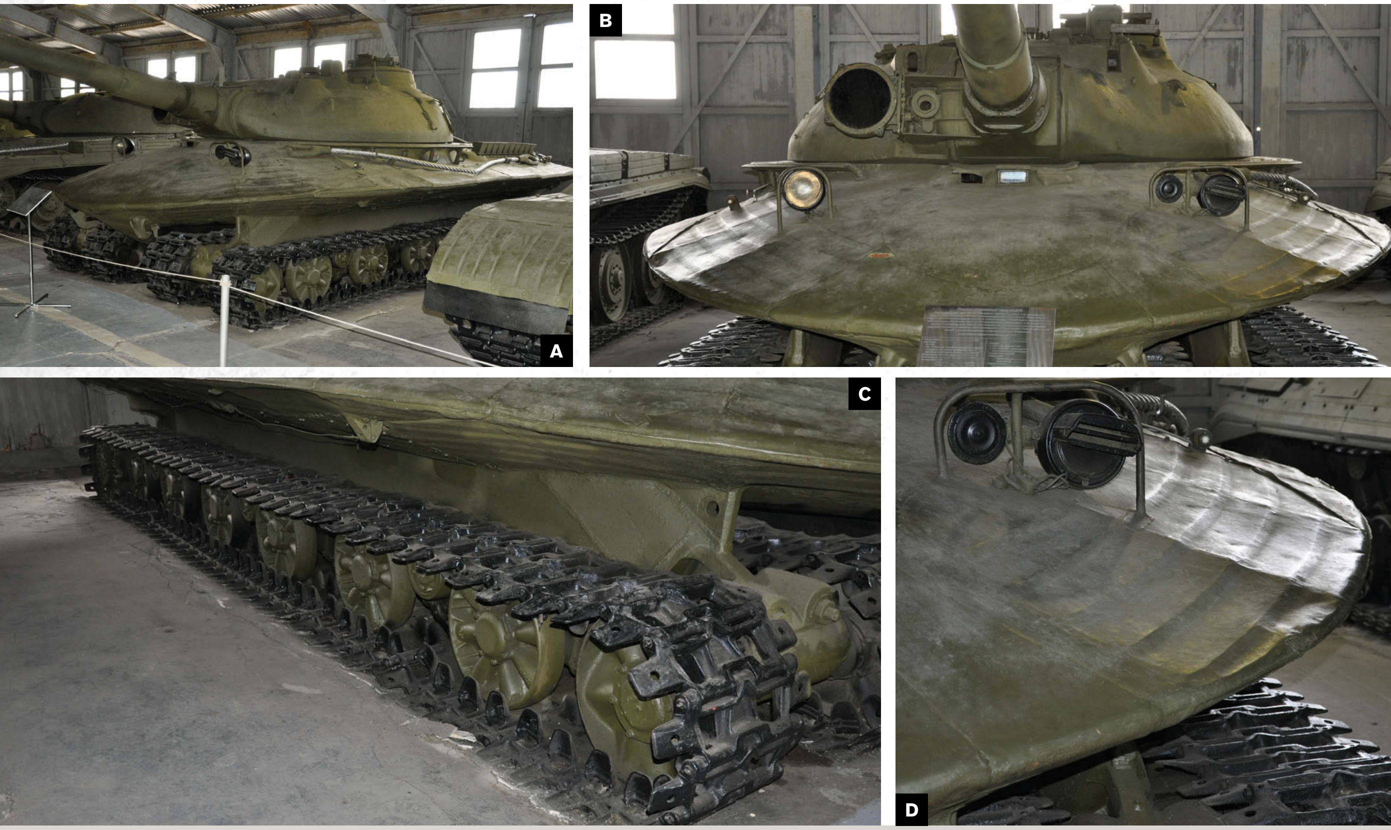
Ultimately, the great overall length of the Obiekt-277 due to its long gun barrel, teething troubles with the engine and driveline, and the fact that the tank was 5 tonnes over its design weight limit, led to the tank being cancelled in accordance with a resolution of the SM SSSR issued on 19 July 1960.

OBIEKT-278 HEAVY TANK

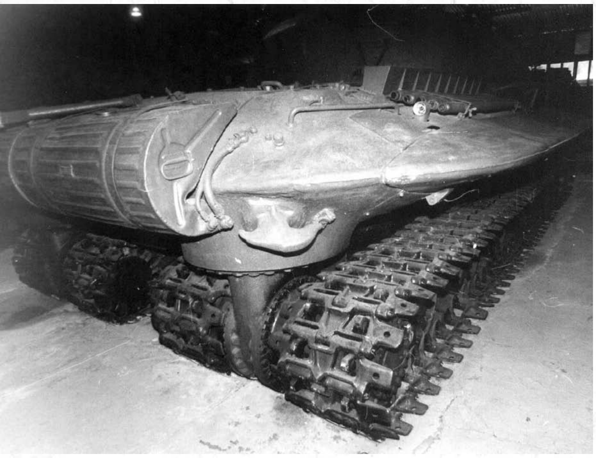
The Obiekt-278 prototype was developed on the chassis of one of the Obiekt-277 prototypes. It was fitted with a GTD-1 gas turbine engine and planetary transmission. There were no changes to the armament or the armour configuration; however, consideration was given to mounting the 140mm 'Rezets' smoothbore gun on the potential future Soviet heavy tank design. The 'Rezets' could penetrate 342mm of vertical armour at 1,000m and 310mm at 2,000m, reducing to 169mm and 155mm at 60° slope at the same respective ranges.

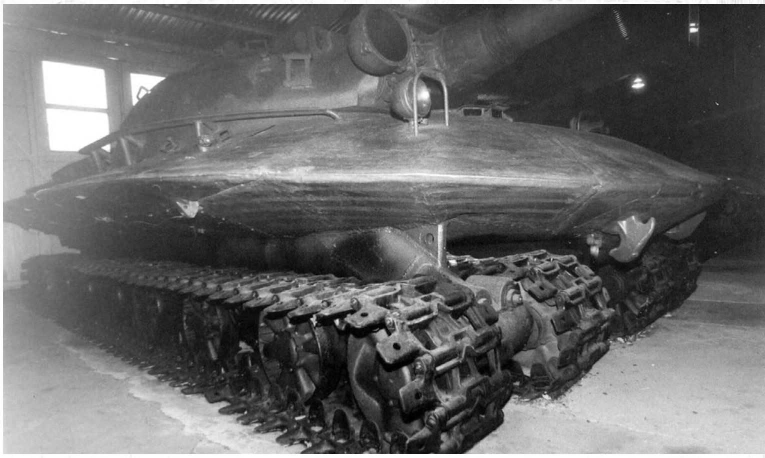
The Obiekt-278 project was also cancelled by the same resolution of the SM SSSR dated 19 July 1960 that terminated the Obiekt-277 on which it was based.

After prolonged experimentation with potential future conventional gun armament for future generation heavy tanks, the MO SSSR issued an order on 19 January 1961 requiring both heavy tank plants to submit their proposals for modernizing the Obiekt-272 (T-10M). ChTZ proposals submitted in April 1961 that considered reducing the combat weight to 45–46 metric tonnes were rejected on the basis that the work equated to developing a new tank design. LKZ proposals for the significantly up-armed and armoured Obiekt-277 were rejected for similar reasons, notwithstanding that the 55 tonne combat weight was well over design limits previously imposed on future heavy tank designs. In the meantime, however, the ChTZ alternative proposal for arming the Obiekt-272 with the 'Falanga' ATGM was approved for further development.

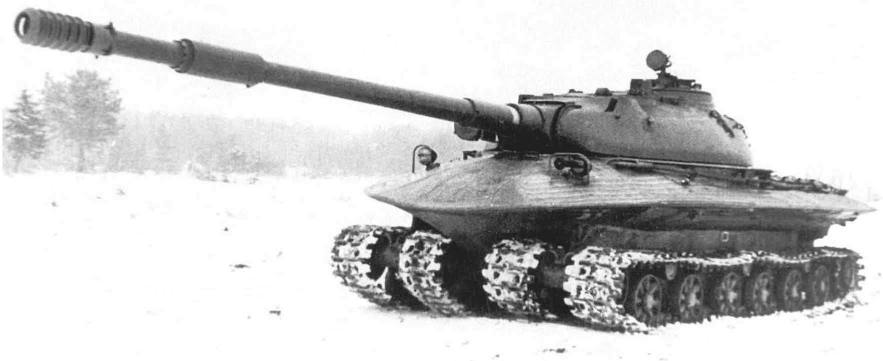


(A) The Obiekt-279's unique hull and quadruple track arrangement were based on T-10 components, but even the turret design was highly modified, as evidenced by the modified cupola and sighting arrangements. **(B)** The Obiekt-279, now with fresh paint and a helpful nameplate. The hull core is particularly small, with the 'flying saucer' shape built up of relatively thin armour plates, designed to survive the fallout from a proximate nuclear blast. **(C)** The quadruple track on the Obiekt-279, mounted on sponsons, gave the Obiekt-279 unparalleled ground floatation ability, so that it was sometimes, not altogether erroneously, referred to as a 'swamp tank'. **(D)** The unique hull shape on the Obiekt-279 was developed to withstand a nuclear blast wave.





ABOVE LEFT AND RIGHT: The Obiekt-279 in the very early 1990s, when Kubinka was still under strict security. The haze is in part a reflection of ice crystals from the lights in the freezing hangar, but nevertheless gives the Obiekt-279 the correct aura.



RIGHT: The quite bizarre Obiekt-279 was related to the T-10 and used many T-10 components. The turret and armament are conventional, the hull, suspension and quadruple track far from it. The Obiekt-279 was designed to survive and operate within a nuclear warfare environment.

OBIEKT-279 SPECIAL PURPOSE HEAVY TANK

The Soviet Army always envisaged that any conflict with NATO in Europe would involve a tactical nuclear element, and indeed NATO also planned for the use of tactical nuclear weapons should Soviet forces break across the north German plains, an area expected otherwise to be held only for a matter of days despite being the region where a significant percentage of NATO's armour in Europe was based.

Envisaging that armoured conflict under a nuclear warfare scenario was a reality to be planned for, Soviet tank designers were early to introduce NBC linings, filters and PAZ overpressure systems. More remarkably, they also designed tanks specifically for operation within and optimized to survive under the conditions of an envisaged nuclear battlefield scenario.

One such design was the unique Obiekt-279 heavy tank prototype, created by the VNII-100 bureau at LKZ, which used components of the T-10 series and mounted the 130mm M-65 tank gun taken from the earlier IS-7 heavy tank program. The Obiekt-279 was listed by LKZ as a tank of *spetsialnogo naznacheniya* (special purpose), the same designation coincidentally given to Russian Special Forces, in this case abbreviated to SpetsNaz.

The Obiekt-279 heavy tank was designed to provide both an element of direct blast protection and enhanced radiation protection to its crew, while being capable of crossing any type of terrain encountered – forests with felled trees, devastated buildings, marshes or swamps, snow or thick dust and sand. To that end, it was equipped with four sets of tracks under the tank and an elevated driveline that drove the tracks via pylons, mounted on a 'flying saucer' shaped hull made up of a relatively small armoured core and levels of steeply inclined but relatively thin outer armour, so that, theoretically at least, a nuclear blast wave might better pass over the tank rather than flipping it.

Testing of the quite bizarre looking Obiekt-279, sometimes erroneously (though not entirely) called the 'swamp tank', showed the track system to be relatively practical despite its bizarre appearance, and the tank had tremendous mobility over all sorts of obstacles and terrain features. While the idea proved technically workable, its Achilles heel was that the tank was nearly impossible to maintain under field conditions, and had to be partially disassembled for transport via the Soviet railway system. Work was terminated in January 1961 after two (in some references three) prototypes were built and tested.

OBIEKT-282 ATGM VEHICLE

Concurrently with the decision to abandon the Obiekt-268 SPG variant of the T-10, and indeed all heavy tank based self-propelled guns, development work accelerated on the next generation of 'Istribitel Tank' (IT) tank-hunter designs, based on rocket technology.

In 1957 the OKTB at the LKZ plant began work on the purpose designed Obiekt-282 missile tank, the first Soviet heavy tank to be fitted with a guided ATGM system. The Obiekt-282 was to be armed with the 'Salamandra' guided ATGM then in development at the NII-48 institute.

The Obiekt-282 was developed at LKZ on the basis of the T-10M under the direction of Iosef Kotin, in response to a resolution of the SM SSSR dated 8 May 1957, which required the development of such a system as a long range tank-killer and for the breakthrough of defensive positions defended by enemy armour.

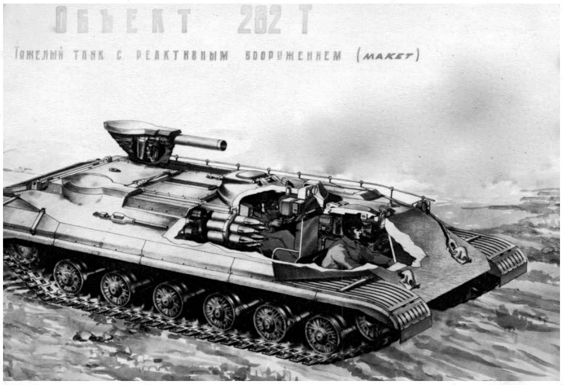
A running prototype Obiekt-282 was built for evaluation trials in 1959, based on a turretless and heavily modified series production T-10 chassis. The three-compartment hull was extensively modified in order to mount the ATGM system. The fuel tanks were moved forward to the modified vehicle nose section, providing space in the MTO compartment for the retractable ATGM launch systems mounted either side of it. A 30mm armour plate was added over the original distinctive 'schuka' bow, altering the glacis profile to a two-profile flat plate arrangement then more commonly seen on Soviet MBTs such as the T-54 and T-55.

The Obiekt-282 had a crew of two who were seated in a tandem arrangement. The driver-mechanic sat on the vehicle centreline as with the standard T-10 tank, with the vehicle commander seated immediately behind and provided with a large diameter, low profile rotating cupola. The Obiekt-282 apparently also provided additional radiation protection for the crew.

The engine and transmission (MTO) compartments were unchanged from the standard T-10. The Obiekt-282 was shorter than the T-10, with six road wheels (as against seven on the T-10) and four return rollers. The torsion bar suspension was strengthened by the use of additional hydraulic shock absorbers like those in the Obiekt-277.

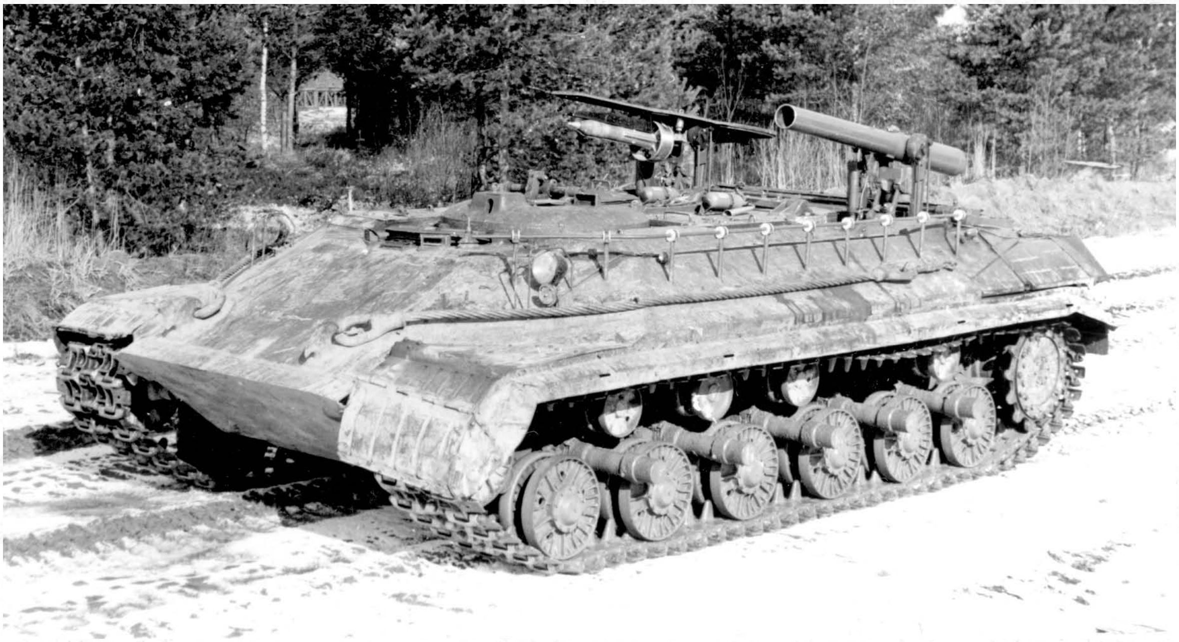
The technical project considered the installation of two alternative retractable launchers for the 'Salamandra' guided ATGM, mounted either side of the MTO, with the systems retracted into the space vacated by the fuel tanks normally located either side of the engine but moved forward on the Obiekt-282. The right launcher featured an open rail ATGM mounting located under a retractable armoured roof section, while the left launcher, also retractable, featured a tube launched ATGM arrangement.

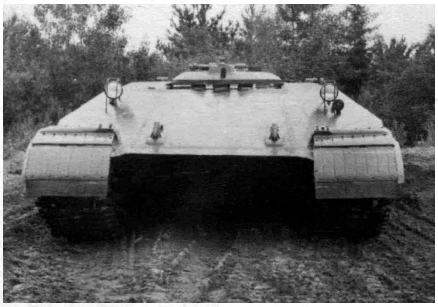
The 'Salamandra' ATGM missiles, mounting cumulative (HEAT) warheads capable of defeating 500mm of vertical armour were sizeable, at 1.55m in length and 0.54m in diameter with the wings extended. Guidance was a semi-automatic (SACLOS) optical system with radar guidance and radio command. The system had a maximum daytime range of 3,000m, which reduced to 1,000m at night. The intended complement was 20–25 missiles. A simpler ATGM arrangement without the complex guidance and with ranging by a 7.62mm SGMT machine gun was also considered as an option.


ОБЪЕКТ 282 Т
Тяжелый танк с реактивным вооружением (макет)

The Obiekt-282T as envisaged at the initial project stage, 1958.

Ultimately, the Obiekt-282 was not taken into service as the NII-48 institute encountered significant difficulties making the 'Salamandra' ATGM missile design workable. Further development was however undertaken with unguided TRS-132 and TRS-152 ATGM rockets as the Obiekt-282T, with a modified V-12-7 engine being also installed on the new prototype test-bed vehicle.





TOP: The Obiekt-282T during evaluation trials in 1959.

ABOVE LEFT: The Obiekt-282T with all armament retracted.

ABOVE RIGHT: A low resolution but interesting view of the Obiekt-282T during trials.

Obiekt-282T ATGM Vehicle

The 'Salamandra' ATGM missile system as trialled on the Obiekt-282 was ultimately deemed unsuccessful, and the development programme cancelled. However, development of alternative ATGM systems continued on the modified original Obiekt-282 chassis, with the reworked Obiekt-282 in its final configuration receiving the designation Obiekt-282T.

The Obiekt-282T was to be armed with either the 152mm TRS-152 anti-tank rocket with an ammunition complement of 22 rockets, or the 132mm TRS-132 with an ammunition complement of 30 rockets. Both rocket types were unguided in flight, and were controlled by the simplified 'Topol' fire control system. The system featured horizontally mounted drum magazines in the fighting compartment. The left side magazines mounted eight 132mm TRS-132 rockets, and the right side magazine mounted six

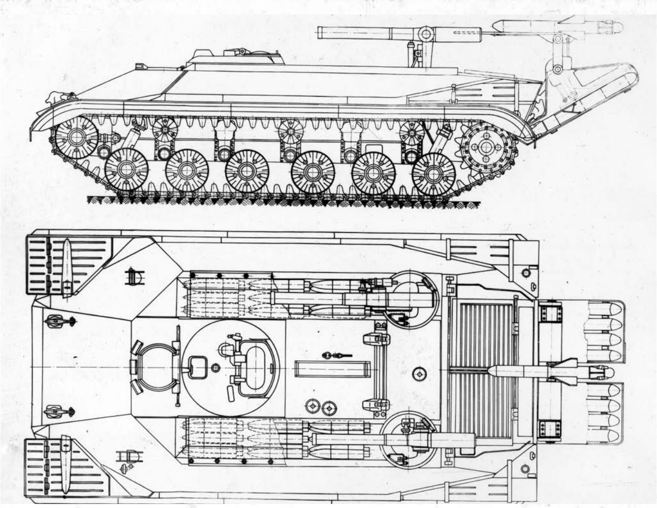
152mm TRS-152 rockets. A single hydraulically elevated launcher was mounted on the turret centreline. Additional rockets, five 152mm rockets on the left and seven 132mm rockets to the right, were stored under the launcher system.

The Obiekt-282T was significantly modified from the earlier Obiekt-282, being not just an ATGM system mounted on a heavy tank chassis but an entire re-design incorporating many novel design features. The Obiekt-282T was smaller than the T-10, having a shortened chassis with six road wheels per side and, significantly considering its role, a low profile with a height of only 2.1m. The front of the tank hull was modified and the fuel tanks moved forward, with a 30mm steel firewall between them and the crew. It was less heavily armoured than the T-10 line tank from which it was derived, with the frontal glacis being 150mm and angled at 64° from vertical. The armour nevertheless provided immunity from 122mm anti-tank rounds with a muzzle velocity of 1,000m/s and cumulative 85mm anti-tank rounds. As a more fundamental re-design, the Obiekt-282T was provided with a double skin of armour on the hull floor, with the second layer providing an armoured floor to the fighting compartment 500mm above the actual hull floor, almost half the fighting compartment height of 1250mm. The double skin arrangement was to provide protection from anti-tank mines. The upper side armour was 60mm at 50° (it was 80mm on the T-10) and the lower side armour 60mm at 73° from vertical. The upper sides were 150mm within the hull at 50°.

The engine was also new, a supercharged V-12-7 developing 1,000hp, which gave the vehicle a maximum speed of 55km/h.

With no large turret and an entirely new under-armour configuration, the low profile Obiekt-282T had one of the highest levels of overall armour protection of its time, for a significantly lower combat weight of 44 tonnes. The Obiekt-282T was powered by a V-12F (*forsirovanniy* – forced/supercharged) diesel engine providing 1,000hp, with improved filtration and cooling compared with the base T-10 tank, driving the tracks via an 8-speed planetary transmission. The torsion-bar suspension was complemented by additional hydraulic shock absorbers, as with the original Obiekt-282. The Obiekt-282 and Obiekt-282T were both shorter than the T-10, with six road wheels (as against seven on the T-10) and four return rollers. The vehicle had a maximum road speed of 55km/h and a range of 500km. Ground pressure was 0.75kg/cm^2.

The Obiekt-282T was in principle another game changing weapons system; however, during trials the 'Topol' guidance system was troublesome, proving insufficiently reliable for service, which was a consistent issue in the early years of such weapons development. Overall, though, the testing successfully proved the capability of such tank mounted ATGM systems, and although the Obiekt-282T project was abandoned, work continued very successfully on mounting such systems on the medium (MBT) tank rather than heavy tank chassis.



The concept drawings for the Obiekt-282K, which was not developed to prototype stage.

Obiekt-282K ATGM Vehicle

A final development of the Obiekt-282 series of T-10 chassis mounted ATGM systems was the Obiekt-282K, developed in 1959 at the OTKB at the LKZ Kirov plant in Leningrad as a modernized version of the Obiekt-282T under the designation Obiekt-282K.

The vehicle was armed with two TRS-132 tube-type rocket launchers, each with 20 rockets located within their respective sides of the hull, with a 152mm PURS-2 launcher located on an open mount at the rear of the vehicle, with one ready to launch rocket on the launch rail and eight rockets in cassettes mounted over the rear of the vehicle. The fire control system was transferred without change from the Obiekt-282T. The Obiekt-282K had an even lower silhouette of 1.9m with the TRS-132 and PURS-2 launchers retracted, and a combat weight of 46.5 tonnes.

Unfortunately, due to the unsuccessful result of Obiekt-282T testing, development work on the Obiekt-282K did not reach the stage of building a prototype. A final derivative of the Obiekt-282 'series', the Obiekt-282M, also never left the drawing board, and with that development of anti-tank rocket versions of the T-10 came to an abrupt halt.

In reality, all T-10 based ATGM armed developments were in part undertaken in order to maintain the lifespan of the T-10 chassis and the heavy tank as a concept at a time when Soviet Premier Khrushchev was pressurizing for the development of rocket systems as tank armament, while the heavy tank as a concept was giving way to the Main Battle Tank in the Soviet Union and abroad. The need for anti-tank rocket systems mounted on heavy tank chassis, and indeed the heavy tank chassis on which they were developed, was ultimately consigned to history due to the rapid changes in military technology being introduced from the very late 1950s onwards. The first generation of Soviet long range anti-tank rockets would be mounted on light wheeled vehicles, as by the end of the 1950s there was no longer any strategic need to mount these long range anti-tank weapons on tank chassis.

OBIEKT-284 HEAVY TANK

Obiekt-284 was the designation given to a development undertaken at OKBT LKZ in 1957 and 1958 in conjunction with several design institutes, related to an experimental long range 'dalnometer' or rangefinder installation (abbreviated in Russian to TRLD) which was accompanied by experimental work on night vision devices for the main armament and also for the driver-mechanic. In accordance with Resolution SM SSSR No. 505-253 dated 8 May 1957, a plant prototype was to be completed and ready for trials in 1960, with the intent of installing the system in series production tanks by 1962 or 1963.

Test firing with a prototype Obiekt-272 (No. 5803B01) mounting the 122mm M-62T2 gun was conducted at the TsUAOP polygon at Luzhskoy, where, firing from rest, accurate fire was attained using the rangefinder to a then outstanding range of 2,500–3,000m. The results were such that on 5 November 1959 GKSMOT made the decision that the TRLD rangefinder should be installed in all MBTs and heavy tanks, with the turrets modified to accommodate the new installation. In the next year, OKBT LKZ in collaboration with the TsNII-173 institute continued to refine the TRLD system, but in February 1961 GKSMOT changed tack and gave instructions to work on a new rangefinder, the 'Skala-2' as developed at the NPZ plant in Novosibirsk. Work continued in this direction until early 1962, when LKZ mounted an operational 'Skala-2' rangefinder system into a T-10M tank, designated Obiekt-284, which was sent for testing at the Luzhskoy polygon. Work meantime continued at the TsNII-73 institute on a further upgrade, the 'Skala-3', for use with rocket assisted rounds. LKZ rebuilt the prototype to accommodate the new system, including the fitment of a GDL-10 generator to power its electrical power requirements. The 'Skala' system was continually developed, with the final variant of the Obiekt-284 fitted with the 'Skala-3' rangefinder system tested at the plant in the spring of 1965.

It is noteworthy that from May 1960 parallel development work was carried out at VNII-100 on a competing system to the TRLD, using a 4mm frequency bandwidth radio-location rangefinder, a frequency range used rather successfully by bats that know about judging distances in the dark. For 20th century Soviet tank purposes, the advantage was that the compact system would not require the major changes to the turret required by the original TRLD system. This work, designated TRLD 'Lilia', was sanctioned in accordance with Resolution SM SSSR No. 174-62 dated 18 February 1960 and developed at VNII-100, and is a long and specific story in and of itself.

OBIEKT-292 HEAVY TANK

While consideration was being given to the next potential generation of Soviet heavy tanks, the Obiekt-277, 278 and 279, work continued in parallel on keeping the T-10 in service. On 24 June 1960, the Technical Committee of OKTB, reporting to Iosef Kotin, put forward a new design, the Obiekt-292, which perfected the development work of previous years and eliminated issues uncovered with the T-10 series in service. The project, headed by N. M. Chistyakov, suggested installation of the more heavily armoured turret from the Obiekt-277 with its powerful 130mm M-65 gun and mechanical loading mechanism. Despite the heavier turret armour, adding 3,200kg, the extensive use of cast titanium armour elements in the construction of the hull and the running gear saved 3,320kg compared with the production T-10M, thereby maintaining the combat weight in the range of 51–52 tonnes. The armour for the Obiekt-292 was to include bi-metal armour consisting of 65mm aluminium and 160mm cast titanium plate. Development of titanium and aluminium and titanium mixed armour continued in co-operation with VNII-100 for several years.

A new diesel engine was to be installed, developing 800hp, coupled to a standard T-10M gearbox but with consideration for installing an automatic hydraulic transmission (GMAT, *Gidro-Mechanicheskaya Avtomaticheskaya Trasnsmissiya*), which was developed under the direction of A. I. Safonov. The project drawings for this were to be presented to the Technical Committee of OKTB on 17 May 1960. The GMAT transmission would provide a further weight saving of 700–800kg. Larger diameter (220mm) road wheels were to be fitted to increase floatation on soft ground and the suspension was also to be softened.

To reduce the overall combat weight of the Obiekt-292 further, it was proposed to use titanium tracks, saving a further 1,500kg in overall combat weight, while wear and tear at 1,500km was as for conventional VT-3-1 cast steel tracks that had covered 1,700km. Minor changes to the conventional track were also proposed to increase track life. Testing of the new titanium track on the proposed Obiekt-292 was planned for NIIBT polygon at Kubinka in the late summer of 1961. However, neither the track design nor the proposed prototype on which it was to be tested survived long enough to keep the appointment. Although the Obiekt-292 never left the drawing board, the GMAT transmission was recommended for future series production heavy tank designs and for installation in the experimental Obiekt-286, to be armed with anti-tank missiles.

OBIEKT-700 SERIES DEVELOPMENTS (NOMINALLY ChKZ/ChTZ PROJECTS)

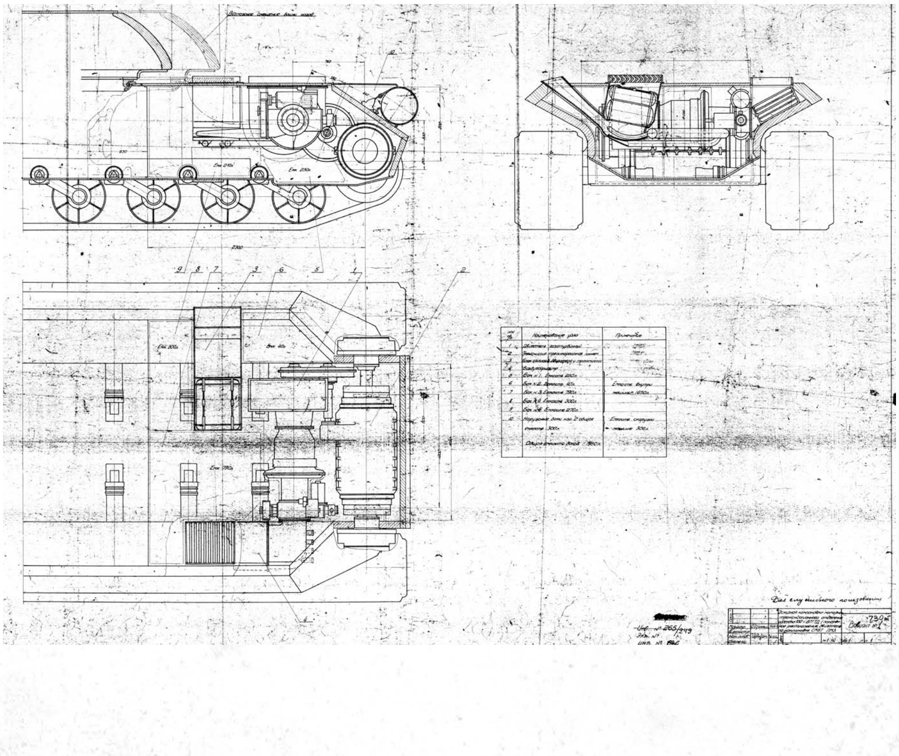
OBIEKT-709 TRANSMISSION TEST PROTOTYPE

The Obiekt-709 was developed at ChKZ to test a new simplified gearbox and transmission arrangement for the production T-10. The new MPP (*mekhanizm peredachi i povorota* – gearbox and steering mechanism) system, consisting of a six-stage, three-shaft gearbox and ZK planetary transmission for steering, was now combined in a single transmission unit. The results were a simplified transmission that was smaller, 507kg lighter and more reliable. The new smaller MPP arrangement allowed for another 100 litres of fuel to be located under armour.

As with many prototype 'Obiekt' designs, the new gearbox and transmission was originally developed as a 'reserve' variant, but proved simpler to manufacture and maintain in service, and so was adopted for series production on the T-10M from December 1962.

OBIEKT-730 GTD GAS TURBINE ENGINE PROJECT

Plans were developed for a gas turbine engine variant of the Obiekt-730 (T-10). In addition to mounting a GTD engine in place of the standard V-12-5 installation, the fuel tank arrangements were modified to compensate for the increase in fuel consumption. Five internal tanks with 1,650 litres of



In 1952, one of the potential production variants of the Obiekt-730 was the Obiekt-730 GTD, to be fitted with a gas turbine engine. To compensate for the significantly greater fuel consumption, the space provided by the smaller engine installation was to be taken up by additional fuel tanks within the hull, with a total of 1,650 litres of fuel under armour, and an additional 300 litres in external fuel tanks.

fuel, complemented by two external tanks with an additional 300 litres, provided a total fuel capacity of 1,950 litres. The project did not progress beyond concept stage.

OBIEKT-739 FIRE SUPPRESSION SYSTEM TEST PROTOTYPE

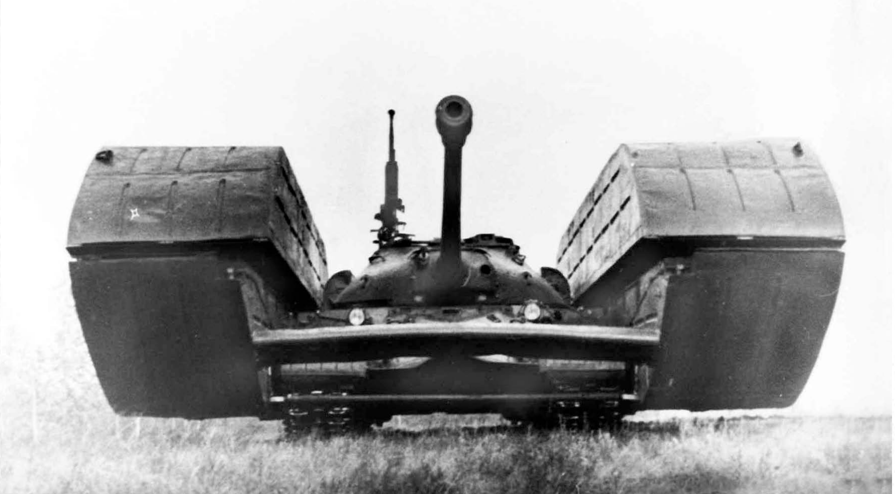
The Obiekt-739 was a T-10 variant used for developing and testing of an automated PPO fire suppression system.

OBIEKT-752 HEAVY TANK

The design drawings for the Obiekt-752 heavy tank were considered at LKZ based on a set of TTKh specifications for a radical re-design of the T-10 series. The T-10 series hull was used in the project design, but with six large diameter road wheels with internal amortization taken from the Obiekt-770, and hydro-mechanical transmission. The Obiekt-752 was, as with many projects, a series of considerations rather than a single design. Among the options considered on the original design drawings was the use of an automated elevator system for the envisaged 122mm M-62-T2 gun, which took rounds from stowage in the hull and up into the turret in a similar manner to the ammunition magazines on warships. The tank was to be powered by an uprated diesel engine, with 700 litres of fuel to be under armour, of which 500 litres would be located under a sub-floor arrangement deep within the hull. Reflecting developments in OPVT snorkelling systems, the tank was also to have the ability to wade up to 4m as standard. The project did not progress beyond the project design stage.

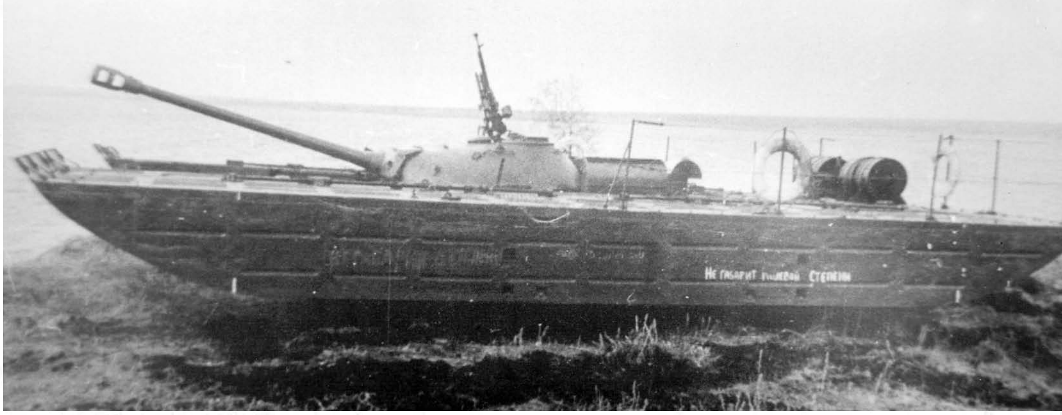
OBIEKT-755 (T-10 WITH PST AMPHIBIOUS SYSTEM)

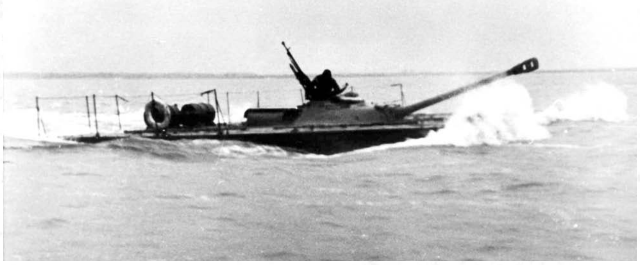
An *Individualnie Sredstva Perepravi Dlya Tyazhelogo Tanka* – i.e. individual crossing (swimming) means – was developed for the T-10 in 1957 under the development designation Obiekt-755, also known as the *Plavsredstava* (*Plavayushchaya Sredstva* – Tank) usually and for good reason abbreviated to PST.

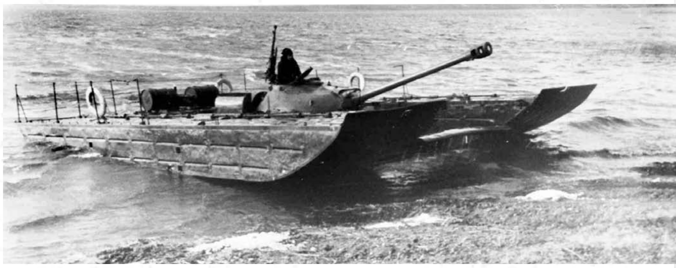


The original Obiekt-755 (PST) prototype on land with pontoons folded for transit. A later prototype used the later T-10M for development purposes.

RIGHT: The original prototype Obiekt-755 with pontoons unfolded for deployment. Note the wave deflectors, the guard handrails, external long range fuel tanks and even the provision of three lifebuoy stations.







ABOVE LEFT: The original Obiekt-755 during sea trials. At sea the 12.7mm DShKM anti-aircraft machine gun would have been doubtless most welcome for the slow moving 12m long, 10m wide PST in the event of approaching enemy aircraft.

ABOVE RIGHT: The original Obiekt-755 coming ashore. On landing, the pontoons would be jettisoned by the driver-mechanic from within the tank, which would then operate on land as normal.

An early production T-10 was used in the experiments, developed as a joint initiative between the KB at ChKZ (which modified the tank), the Novoshinskiy Sudostroitelniy Zavod (NSK) Oka shipbuilding plant (which developed and built the pontoons) and the Krasnoe Sormovo (KS) plant (the same plant that had formerly built T-34 tanks), tasked with building the *plavsredstva* or powered swimming equipment.

The original system was tested in 1957 using an early T-10 for trials purposes, but despite reasonable results, it was not accepted for service. The system was reworked and between 1959 and 1961 a new version was built and tested for service, now using a T-10M heavy tank.

The PST consisted of welded pontoons filled with polyurethane foam, with two two-section pontoons mounted either side of the T-10 and additional small sections mounted on the nose and tail of the tank (though these are not evident on all photographs). In transit the hinged outer pontoon sections were folded on top of the inboard pontoons. The PST pontoon set had a total weight of 14,635kg. Mounting the system on the T-10 (M) tank required a crew of six to eight working for one and a half to two hours with the assistance of a 3 tonne crane. On landing back onshore, the PST system could be ejected by the driver-mechanic without the requirement for any tank crew to leave the vehicle.

In water the PST system was moved by two propellers, mounted at the rear of the inner pontoons and driven by the main engine via a specialized PTO and gear reduction system in a similar arrangement to the GSP amphibious pontoon ferry. The PST system had a maximum water speed of 11.5km/h. In water, the complete system was 12m long and 10m wide.

While the system worked well enough, it was large, bulky and required the tank to be fully ashore before the pontoons could be jettisoned. It was felt to be unworkable in practice and hence dropped. The subject was not, however, and all manner of experiments continued using MBTs such as the T-62 and other vehicles such as the ZSU-57-2 as test vehicles.

OBIEKT-756 T-10M WITH ADDITIONAL NBC PROTECTION

From 1958, work was conducted at VNII-100 on providing additional radiation protection for the T-10M, with work primarily carried out under the designator Obiekt-756. As a result of this experimental work, radiation liners and an overpressure system were introduced on later production T-10Ms produced at both the ChKZ and LKZ plants.

OBIEKT-757 WITH THE ‘KOBRA’ AND ‘RUBIN’ ATGM

The Obiekt-757 was developed from 1958 under the direction of P. P. Isakov at ChTZ as a missile armed heavy tank destroyer, the first such specialized rocket armed anti-tank vehicle to be developed in the Soviet Union. The Obiekt-757 was ultimately developed in two consecutive versions testing first the ‘Kobra’ and latterly the ‘Rubin’ PTUR (ATGM) systems.

The Obiekt-757 was in and of itself a significantly advanced prototype. The hull was based on the T-10 series but incorporated the hydro-mechanical transmission, pneumatic assisted suspension and large diameter road wheels with internal amortization taken from the Obiekt-770. The experimental armament was mounted in a particularly low profile turret.

The original version of the Obiekt-757 was armed with an early iteration of the ‘Kobra’ anti-tank guided missile, launched directly via the 160mm smoothbore gun-launcher barrel. The prototype mounted 18 ‘Kobra’ missiles in an autoloader. Secondary armament consisted of a 14.5mm KPVT and a 7.62mm SGMT machine gun.

While the concept was felt to be viable, the original ‘Kobra’ system as mounted for trials purposes was not, and work on the original Obiekt-757 was officially terminated on 30 May 1960. Anti-tank rocket system development continued, however, and from 1962 work began on a second iteration, which reached prototype trials stage in 1963. The original Obiekt-757 prototype was refitted with a new, also smoothbore, 125mm D-126S PU or *puskovaya* *ustanovka* (gun-launcher) with dual-axis gun stabilization, now firing the re-designed 'Rubin' missile developed at the Kolomna design bureau (KBM) by B. I. Shavirin. The 125mm D-125S could fire either the 'Rubin' guided ATGM rocket with a cumulative HEAT warhead or the 'Bur' unguided rocket assisted round with an HE-FRAG warhead.

The 125mm 'Rubin' ATGM rocket had a range of 4,000m at a flying speed of 550m/s and, due to the use of an autoloader system, a rate of fire of four to five rounds per minute. Its 5.5kg cumulative warhead could penetrate 500mm of vertical RHA armour. The 'Rubin' was, however, a significantly large and unwieldy rocket at 1.5m in length.

The 125mm 'Bur' unguided rocket assisted round was developed at NII-147 under the direction of chief engineer A. N. Ganichev. The 'Bur' round had a claimed maximum range of 9,000m at a flying speed of 650–700m/s, and with a rate of fire of eight to ten rounds per minute. A 7.62mm co-axial machine gun was mounted for ranging purposes. The Obiekt-757 had a combat weight of 44 metric tonnes.

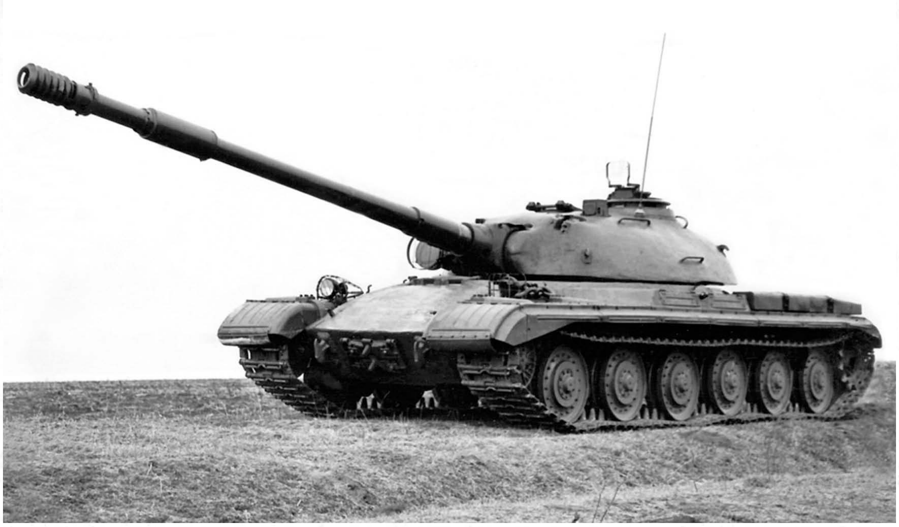
Both variants had a crew of three – commander (to the right of the weapon), weapons operator (to the left) and driver-mechanic (seated on the vehicle centreline).

Although the original and subsequent Obiekt-757 variants both ultimately met the same fate, development work on the Obiekt-757 prototype continued in the guise of the Obiekt-775. The 9K112 'Kobra' missile system tested on the original Obiekt-757 prototype meantime was successfully developed and became part of the standard ammunition complement of the later T-64B and T-80B main battle tanks. The original Obiekt-757 prototype has survived and is today on display at the Muzei Tekhnika in Krasnogorsk in the Western suburbs of Moscow.

OBIEKT-770 HEAVY TANK

The Obiekt-770 was a Chelyabinsk ChKZ plant designed prototype heavy tank that was built to meet the same TTT specifications as Obiekt-277 per a resolution of the SM SSSR dated 12 August 1955. As with the Obiekt-277, it was armed with the 130mm M-65 gun and 14.5mm KVPT machine gun armament, but initially retained the V-12 series engine and driveline components of the standard T-10. It used a new suspension system, however, with six large road wheels using internal amortization as used on the KV heavy tank and later on the T-64MBT.

The Obiekt-770 tank was later fitted with the experimental DTN-10 ten-cylinder two-cycle V-type turbocharged diesel engine developing 1,000hp. During testing the engine could not generate sufficient torque to



The ChKZ designed and built Obiekt-770 coupled with 130mm M-65 main armament to an entirely new suspension with large diameter road wheels with internal amortization. The original engine was latterly replaced by a new V-10 diesel engine developing 1,000hp, but the tank was too large and heavy for service and the project was cancelled in 1961.

power the tank adequately, however. The intent therefore was to replace it with the UTD-42 four-cycle 12-cylinder diesel designed by the Barnaul engine plant, but this never came to pass because of its existing engine problems and the same dimensional and weight problems as the Obiekt-277. The Obiekt-770 project was cancelled on 17 February 1961.

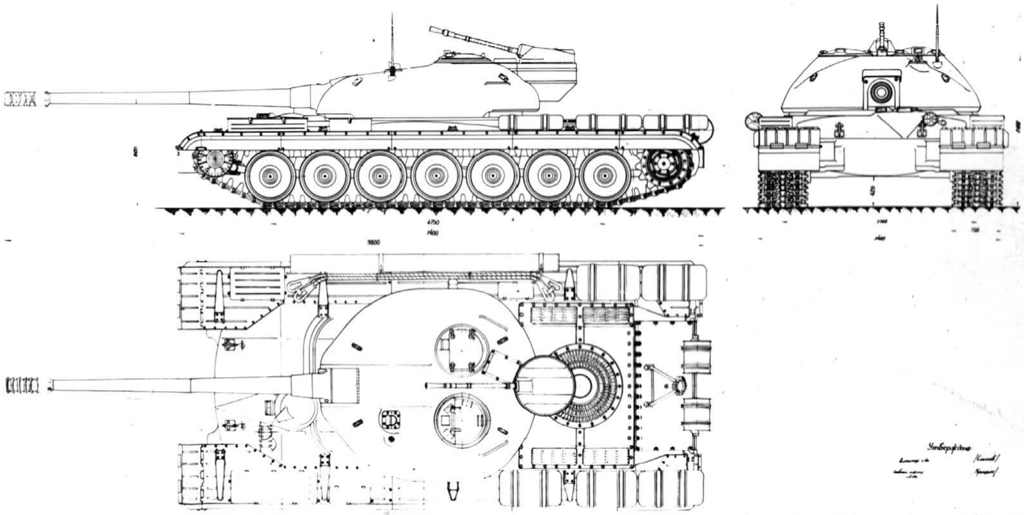
OBIEKT-777 HEAVY TANK

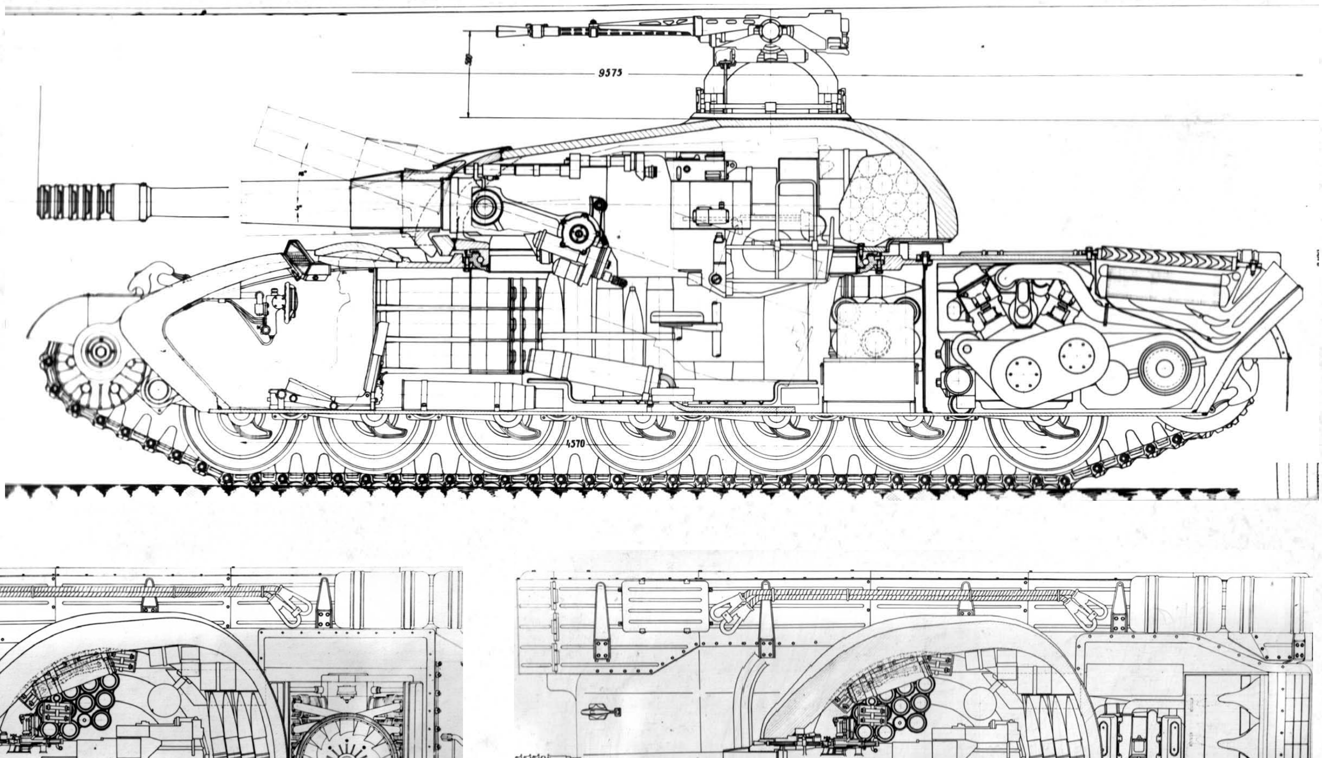
The Obiekt-777 was another radical re-design of the T-10 series that was developed on paper as a potential replacement for the T-10M, but did not progress to prototype stage. The Obiekt-777 also drew its origins from the Obiekt-770, using the T-10 series hull but with seven large (750mm) diameter road wheels with internal amortization and hydro-mechanical transmission. The armament was to have been the 122mm M-62-T2, with 15 armour piercing and 25 HE-FRAG rounds. The secondary armament was reconfigured so that the co-axial weapon was a 7.62mm SGM instead of the 14.5mm KPV of the T-10M, which allowed 3,000 rounds of ammunition for the co-axial weapon to be stowed. A 14.5mm KPV was nevertheless retained as an AAMG, located in a remote control mounting above the turret rear.

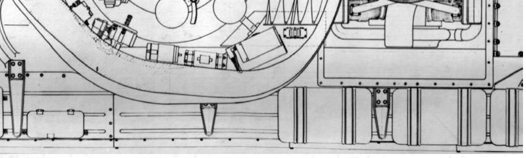
The original design drawings considered alternative engine options, one of which was the installation of a V-12 gas turbine engine developing 850hp, giving the 49.8 tonne tank (still inside the heavy tank limit by 200kg) a maximum road speed of 50km/h. The crew was to be reduced to four due to the use of an autoloader system.

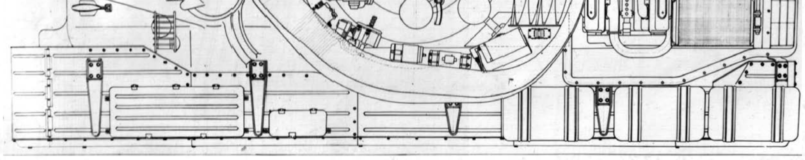
Although reviewed as a design project with completed drawings and options, the Obiekt-777 was not developed beyond concept stage.

THIS PAGE: Plant concept drawings for the projected Obiekt-777. The drawings show different concepts, alternative diesel and GTD gas turbine engine installations and secondary armament arrangements.









EXPERIMENTAL T-10 ARMAMENT INSTALLATIONS

While many prototype heavy tanks were not adopted for service, some redundant T-10 prototype chassis were modified as test-bed vehicles for the testing of new experimental tank guns.

During the late 1950s and early 1960s, in the continual Soviet effort to gain a firepower edge over NATO tank armament, several radical tank gun developments were considered. These planned developments included a hyper-velocity small calibre gun in the 85–100mm range, a 122–30mm high power rifled gun, and smoothbore weapons in the 125–52mm calibre range. The Soviet Union had a remarkable understanding of American and NATO armament developments. The characteristics of the 105mm L7A1 with which the new M60 was armed were known, but so too was the next generation of higher velocity tank guns intended for deployment on NATO MBTs.

In accordance with Resolution SM SSSR No. 831-371 dated 21 June 1959, the Russian Ministry of Defence (MO) accelerated development work on new armament and ammunition types, with the predominant plant involved being Plant No. 172 (gun development), the NII-24 institute (ammunition development) and the LKZ and ChTZ tank plants. On 17 September 1959, LKZ presented their plans for the Obiekt-278, to be armed with a 140mm smoothbore gun and new sub-calibre APFSDS ammunition types. On 23 September 1959, ChTZ presented their design alternative for the Obiekt-770, also armed with a 140mm smoothbore gun.

Meantime, the more conventional 130mm M-65 tank gun was tested in the Obiekt-278, 279 and 770 prototypes. One of the rounds tested with this gun was the sub-calibre (APDS) 'Taran' armour piercing projectile. This had a muzzle velocity of 1,800m/s and a direct fire range against a 2m target of 2,150m and a 3m (e.g. M60 size tank) of 2,700m. The 'Taran' projectile could penetrate up to 300mm of vertical RHA armour equivalent at range.

A 152mm smoothbore variant of the M-65 'Taran' tank gun was also proposed for testing in these tanks, with an estimated armour penetration of 350mm at range, but this did not leave the drawing board.

The 1959 proposals to arm the LKZ designed Obiekt-278 with the 140mm 'Rezets' smoothbore gun, with a projected maximum armour penetration of 342mm at 1,000m, and similar armament for the ChTZ designed Obiekt-770 were ultimately rejected. While the increased range and accuracy of the proposed 140mm smoothbore weapons were not in doubt, changes in the rifling design of the 130mm M-65 would deliver similar results with less disruption from a manufacturing perspective. It was also discovered that the 130mm M-65 had better armour penetration against inclined armour compared with the more futuristic proposals. Smoothbore weapons would ultimately prevail, however. The marginally smaller calibre 'Molot' and 'Rapira' smoothbore weapon designs were to come into their own on the next generation of MBTs that would outlive the heavy tank in the Soviet Union.

The proposal to re-arm the T-10M with the 130mm M-65 rifled tank gun as the Obiekt-292 also did not come to fruition. A proposed 140mm smoothbore variant of the M-65, the M-62GL, was also suggested for mounting in the T-10M, but suffered the same fate. Meanwhile, from December 1959 to January 1960 the NII-24 institute began firing tests with new sub-calibre rounds fired from a prototype 130mm M-65 with modified rifling, mounted on an LKZ supplied test mule tank, the Obiekt-Eh-277, which greatly increased the performance of the long-proven rifled conventional tank gun.

There was a proposal to mount the hyper-velocity series AK 'Strela' (also called S-133A and S-133S) tank gun in the Obiekt-279 and later convert the Obiekt-730 (T-10) to use this weapon. This was an 85mm calibre weapon with a 12–13m long barrel (!) and using 130mm propellant charges. It was estimated to have a muzzle velocity of 1,550m/s and a direct fire range of 1,730m, and greater muzzle energy than the 115mm 'Molot' tank gun. The change in calibre was considered in order to increase the ammunition complement from 30 to 72 rounds, but the gun did not materialize, perhaps not least of the impracticalities of the barrel length on an armoured chassis. The same armament was also proposed as the armament for a new self-propelled tank hunter or IT tank, (the Obiekt-241) and for installation in the Obiekt-278 and Obiekt-770.

Experiments were conducted at the NIIBT polygon at Kubinka with a standard T-10M (No. 10A004) armed with the 122mm M-62T2 firing sub-calibre fin stabilized rounds as being developed for the 115mm U-5TS for the T-62 MBT. These rounds were developed in cooperation with the NII-24 and VNII-100 institutes, the latter testing firing 88 rounds in January 1963 on a 122mm M-62-T2 tank gun mounted on the carriage of a 203mm B4 tracked howitzer for test purposes.

There were also experiments with the machine gun armament on the T-10M. OKBT LKZ worked on the mounting of a secondary, smaller calibre 7.62mm SGMT alongside the 14.5mm KPVT armament, as experimentally tested on the Obiekt-265. The intent to use this arrangement was apparently due to a suggestion from Marshal of the Soviet Union Grechko, and one T-10M (Obiekt-272) No. 580B01 from the first production batch of 20 tanks was so modified. The SGMT mounting allowed an ammunition complement of 1,500 7.62mm rounds within the tank, which was the main driver for the idea, as with the SGMT mounting on the earlier Obiekt-265. The prototype also mounted an experimental 14.5mm KPVT AAMG, and was tested at NIIBT from November 1958 to April 1959.

T-10 'OPLOT-MO' AUTOMATIC ANTI-ATGM ROCKET DEFENCE SYSTEM

In 1960 and 1961, the military academy BTiMV in co-operation with VNII-100 developed the 'Oplot-MO' automatic anti-ATGM rocket system for use with the T-54B and T-55 MBTs and the T-10M heavy tank. The 'Oplot-MO' anti-rocket defence system was developed by VNII-100 in collaboration with the Kazan Aviation Institute in accordance with a resolution of the SM SSSR dated 18 February 1960.

The 'Oplot-MO' consisted of a six-barrel 14.5mm heavy machine gun developed by NII-61 on the basis of the larger calibre 23mm AO-19 aviation cannon. The system was mounted on the turret together with a radar and fire control system. The radar guided anti-aircraft machine gun automatically engaged incoming ATGMs with an approach speed of 600–800m/s within a range of 200m from the tank and across an elevation range of -5° to +15°. The system was developed to prototype stage and extensively evaluated, but did not enter series production. The later 'Drozd', 'Shtora' and 'Arena' active protection system systems fitted to the T-80 and T-90 MBTs can be traced back to the 'Oplot-MO' system tested on the T-10 chassis.

T-10M WITH HULL MOUNTED TANK GUN (VNII-100 PROJECT)

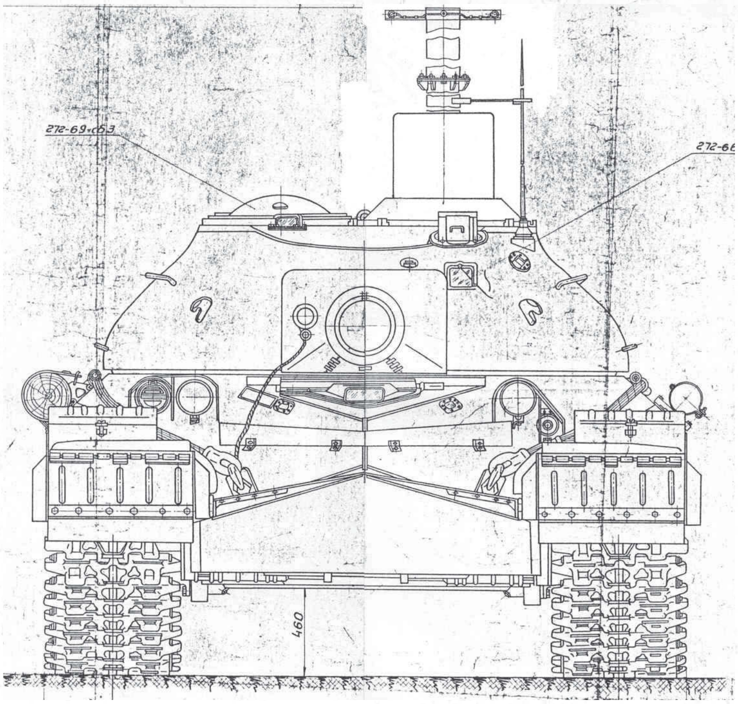
VNII-100 developed a design project for a T-10M variant with a casemate hull mounting a high power tank gun, but this did not progress beyond the concept stage.

T-10M WITH RADAR RANGEFINDER

From the summer of 1959 until 1963 experiments with stereoscopic and radio-location (radar) rangefinders were carried out on several tank types including the T-10M, which were tested at the artillery polygon in the Leningrad military region (LVO). Work on the T-10M was in part carried out under the designator Obiekt-284.

T-10M FITTED WITH OBIEKT-775 TURRET

An Obiekt-775 turret would appear to have been mounted on a standard T-10M chassis for testing PTUR systems intended for potential series production on the Obiekt-432 MBT chassis.

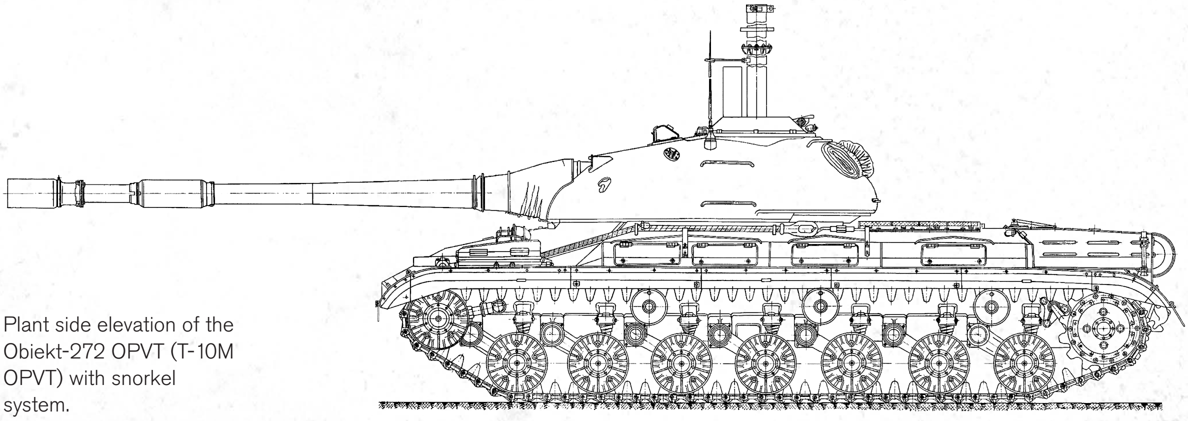


Plant front elevation of the Obiekt-272 OPVT (T-10M OPVT).

T-10 WITH ARMOUR MESH SCREENS

The introduction of HEAT ammunition and ATGM warheads in the 1960s immediately reduced the effectiveness of heavy tank armour. Germany pioneered the use of infantry hand held 'Panzerfaust' weapons, and to counter such weapons, which were particularly effective in built up areas, the Red Army used screens on some T-34 medium and IS-2 heavy tanks during the final weeks of World War II when fighting in these areas became common. Soviet tank designers returned to the theme in the post-war era, and in what was a recurring theme over many years, Soviet tank designers in the 1950s and 1960s proceeded to trial a large number of mesh and grill-type screens to protect the tanks from such munitions, whether hand held, the deadly new anti-tank missile systems or some conventional tank ammunition.

Following on from earlier work conducted on the T-54, the T-10 and T-10M were in the early 1960s experimentally fitted with a protective system of wire screens and panels developed by VNII-100 to defeat cumulative



Plant side elevation of the Obiekt-272 OPVT (T-10M OPVT) with snorkel system.

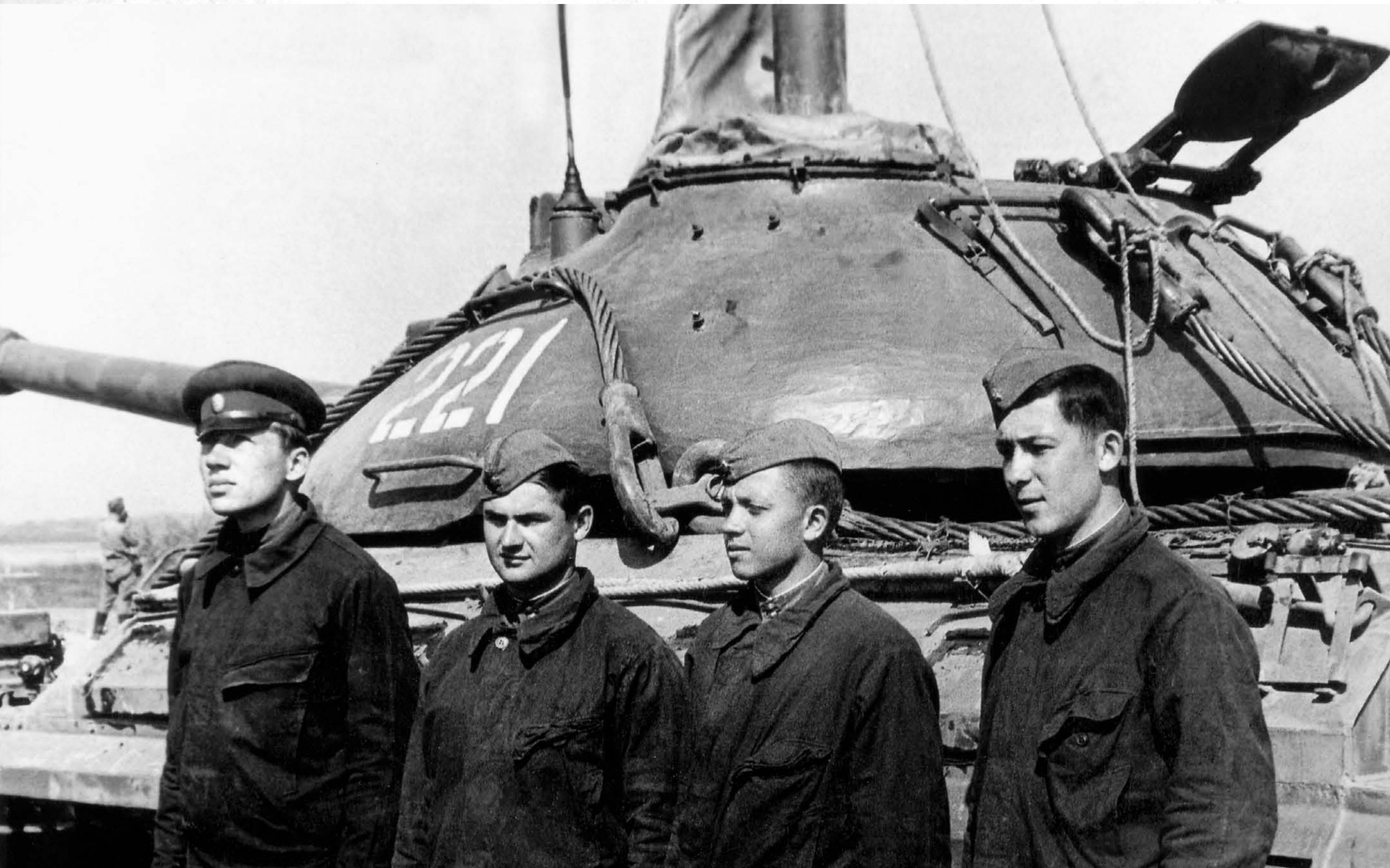
rounds, and adapted for the T-10, T-10M and the T-55. These included side screens and a *zontik* or umbrella-like affair that attached to the main gun barrel, where it was 'opened' for use in combat.

The system was further developed on main battle tanks as the ZEhT-1. However, the system was felt to be too fragile and vulnerable to damage by obstacles and was therefore dropped. Later research led to the introduction of steel reinforced rubber skirting, folding metal shields and *reshetka* grill (bar) armour that provided, and continues today to provide, protection for the same ends.

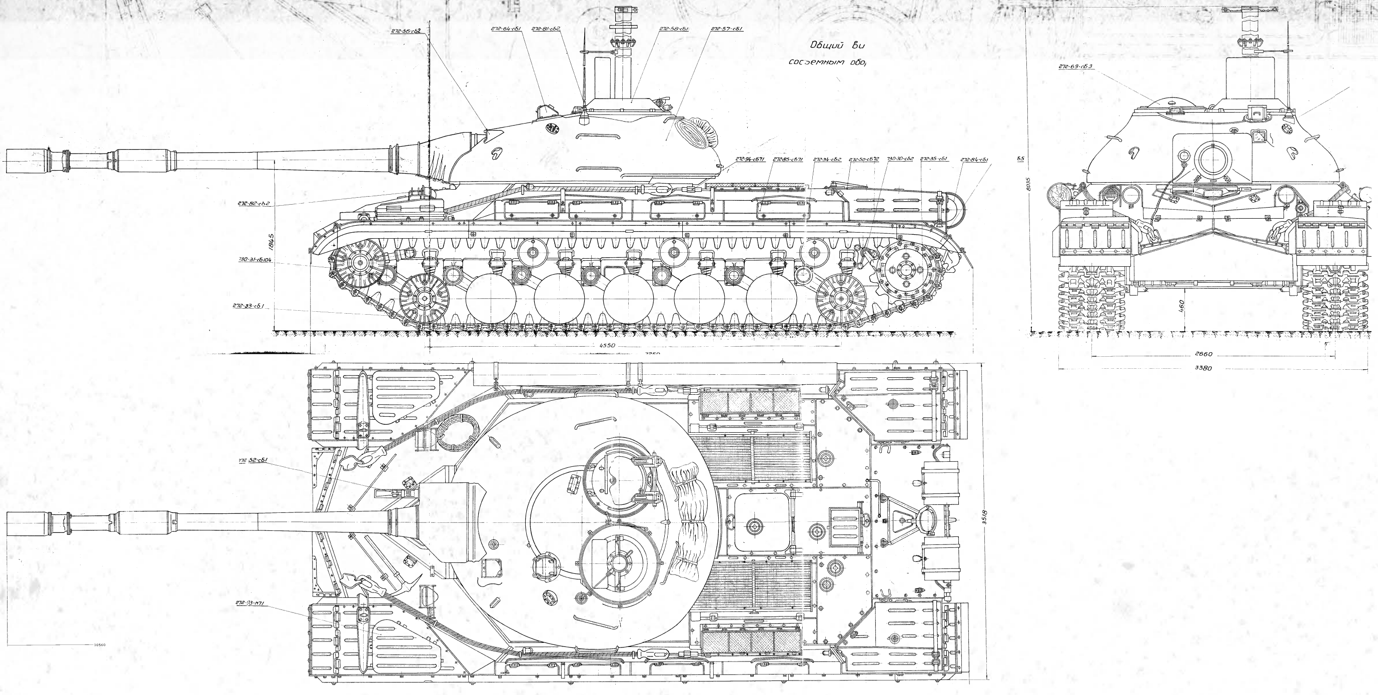
T-10 WITH OPVT DEEP WADING SNORKEL

A deep wading set was developed for the T-10 heavy tank, with work commencing from 1962. The OPVT system – literally 'equipment for underwater tank driving' – provided hermetic sealing of the tank, and the fitment of a snorkel on the turret provided air for the engine and crew and allowed the tank to wade to a depth of 5m and fire directly on leaving the water.

The OPVT system consisted of a snorkel tube supporting underwater operation, an engine protection valve (to prevent backwash into the exhaust and flooding the engine), and a plate to cover the air intakes on the engine deck, as well as hermetic sealing for the gun mantlet, barrel, etc. The commander's and loader's hatches were modified, the commander's



A T-10M fitted with OPVT equipment prepared for deep wading. Note the additional tow cables for use should the tank stall during the highly unpredictable water crossing.



Plant drawings of the Obiekt-272 OPVT (T-10M OPVT).

hatch now being fitted with a plain disc that mounted the snorkel, which was held upright with guy wires. The T-10M with OPVT snorkel erected had a height of 8.035m. A temperature regulation system was fitted, as was a bilge pump, while the crew were provided with IP-46 anti-gas suits (for re-breather use) and SZhT-58 lifejackets for use if the tank stalled in water.

The OPVT system was adopted for service on later T-10M tanks.

2S7 SELF-PROPELLED GUN PROTOTYPE (PROJECT)

During the early concept stage of development of what would later become the 2S7 203mm self-propelled gun, the T-10M was one of several chassis options considered for the new weapon. Concept drawings for mounting the 203mm 2A44 ordnance on the T-10M chassis were completed, but the project was not developed further, and ultimately LKZ used elements of the T-80 MBT for the production 2S7.

TEHS-3 NUCLEAR ELECTRICAL GENERATOR STATION (OBIEKT-27) (OBIEKT-415)

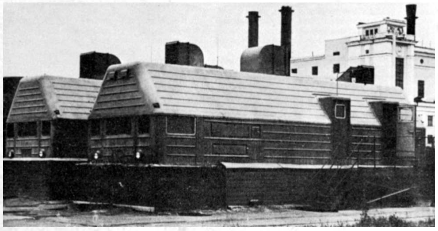
The TEhS-3 was a nuclear powered mobile electric generator built on an extended T-10 chassis. It was developed at the LKZ OKB in Leningrad at the request of Laboratory B in Obninsk under the project designation Obiekt-27, by which name the LKZ plant referred to it.

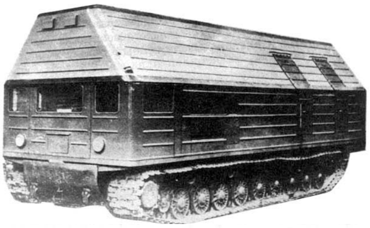
The extended chassis had ten road wheels and an overall weight of 90 tonnes. The TEhS-3 mobile atomic reactor vehicle consisted of an extended T-10 chassis with ten road wheels, on which was mounted a self-contained 1,500kVt nuclear generation system mounted in a ribbed container. The vehicle, which resembled a diesel electric locomotive on tracks, was tested in 1960 but not developed further. The chassis may have been developed under the designation Obiekt-415. Both the designators Obiekt-27 and Obiekt-415 are out of sequence for vehicles developed at LKZ, but the reasoning behind these spurious designators is to date unknown.

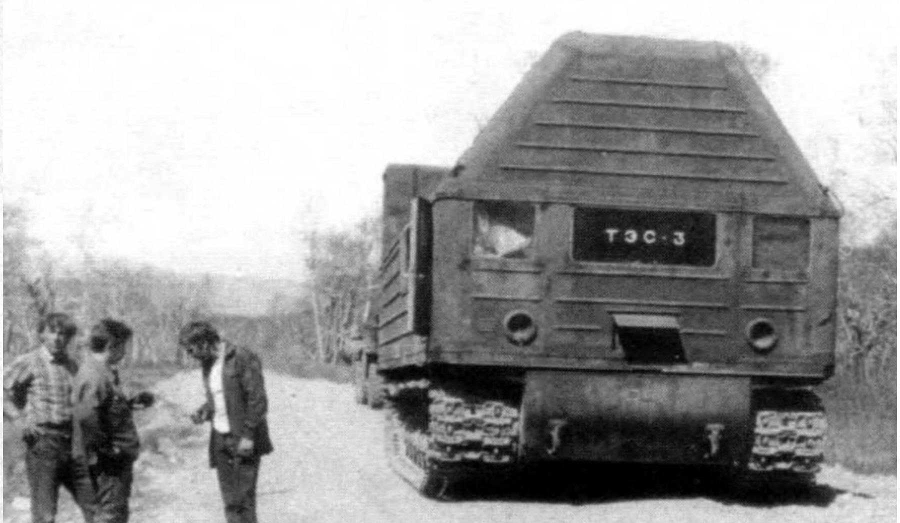
MODERNIZATION AND ARVS

The T-10 series was not subjected to capital rebuilding in the same way as the IS-2M and IS-3M, with many early T-10 tanks serving to the end of their days without upgrade, so that T-10 and T-10A tanks were consequently removed from the Soviet tank inventory in 1997 still in their original plant as-built configuration.

As with the IS-3, the T-10 series was not converted to secondary ARV status. The T-10 and T-10M were retained in Soviet Army service as gun tanks until decommissioned by presidential decree in 1997, several years after the collapse of the Soviet Union.







FAR LEFT: Two TEhS-3 vehicles after installation and commissioning.

LEFT: The TEhS-3-tracked atomic reactor was based on an extended T-10 chassis. The reactor was rated at 8,800kWt and had an electrical power output of 1,500kWt.

BOTTOM LEFT: The TEhS-3 was built and used in the Soviet far north for power generation in very remote areas.

OBIEKT-800 SERIES (SPECIAL PURPOSE CHASSIS BASED ON THE T-10 AND T-10 COMPONENTS)

T-10 BASED OPERATIONAL-TACTICAL ROCKET (OTR) MISSILE SYSTEMS

In the 1950s, Soviet military doctrine began to consider tactical nuclear warfare as a potential aspect of any major future conflict, and to that end the Soviet Union began the development of theatre level battlefield rocket systems. These Operational-Tactical Rocket (OTR) systems (as known in Russian) were to be mounted on light and heavy tank chassis heavily modified from their standard. OTR systems were developed for division, army and front level. The division level weapons were based on a launcher developed using components of the PT-76 tank and generically designated in Russian as 'Mars'. These OTRs were referred to by NATO as 'FROG-2/3/4/5'. Meanwhile, the larger army level 'Filin' and army/front level 8K11 and 8K14 OTR systems were mounted on heavy tank chassis, more specifically highly modified ISU-152 SPH chassis using T-10 series mechanical components.

Obiekt-804 2K4 'Filin' Army and Front Level OTR Rocket System

The Obiekt-804 was a transporter/launcher 'SPU vehicle' developed by LKZ in Leningrad for the 2K4 'Filin' (Eagle Owl) solid fuel army level tactical unguided rocket system. The 2P4 'Tuilpan' launcher for the ZR-2 rocket was based on the hull of an ISU-152K self-propelled howitzer due to its simplicity and size, but used T-10 mechanical components and driveline elements. It had a large, by Soviet norms spacious, and lightly armoured cab at the front of the hull that could seat a crew of up to six members, and heavy gauge brackets at the rear for mounting the elevating launcher rail.

The ZR-2 'Filin' rocket, developed at the NII-1 institute, was a particularly bulky solid fuel rocket capable of delivering a nuclear warhead to a range of 40km. Yield was in the 5 to 10 kiloton range and accuracy or CEP was imperfect, but with nuclear warheads this was not considered critical. The rockets were formed into regiments of three mobile launchers each and assigned at army level. But the system was never widely deployed due to Soviet artillery doctrine, which mandated weapons had to be deployed one third of their maximum range from the line of enemy contact. As this meant the 'Filin' was forced to be within 13km of the front line, it was fully within enemy artillery range and was not seen as survivable.

Obiekt-803 8K11 (R-11) Army and Front Level OTR Rocket System

The Obiekt-803 was a transporter/launcher developed by the LKZ in Leningrad for the 8K11 (R-11) operational-tactical missile system as the 8U218 launcher vehicle. It used the same basic chassis design as the 'Filin', but had a completely different launcher system that used an elevating cradle with a launcher platform that was fixed to the rear of the hull. This platform permitted the missile to be aimed at its target, and launch to take place in a vertical plane rather than elevated to achieve a specific range to target in a ballistic arc.

The 8K11 missile – better known in the West by its NATO nomenclature SS-1b/'SCUD A' – was a liquid fuelled missile developed by the OKB-586 (Yangel) SKB based on the original concepts used in development of the German V-2 missile. It had a range of 170km and could be armed with HE, chemical or nuclear warheads as required, the latter of 5 to 100 kilotons yield. Accuracy was better than the 'Filin' but still was around 1,500–3,000m circular error probable (CEP) at maximum range.

The 8K11/8U218 systems started as army/front level weapons with initial deployment in regiments of three launchers each, but these were eventually enlarged to brigades of three battalions of three launchers each (nine per brigade). As they could be deployed 50–60km back to the rear of the line of contact, they were felt to be viable and served into the mid 1960s.

No reliable figures are available on total production, but can be estimated at 100 to 200 systems. Unlike the rest of the members of the T-10 family, the 8K11 'SCUD A' was provided to Warsaw Pact countries, including Czechoslovakia, Poland and East Germany (the DDR).

Obiekt-816 8K14 (R-17) Army and Front Level OTR Rocket System

The Obiekt-816 was a transporter/launcher developed by the LKZ in Leningrad as the 2P19 launcher vehicle for the 8K14 (R-17) operational-tactical missile system. Externally it was nearly identical to the 8U218 launcher from the R-11 system, but featured a longer elevation cradle and twin, rather than single, compressed air tanks on either side of the cab section.

This launcher system also used an elevating cradle with the launcher platform fixed to the rear of the hull. This platform permitted the pre-targeted missile to be launched vertically rather than elevated to achieve a specific range to target in a ballistic arc.

The 8K14 missile – NATO designation SS-1c or 'SCUD B' – was also developed by the OKB-586 (Yangel) SKB and was essentially an elongated liquid fuelled missile based on the earlier 8K11. It was more precise than the earlier missile and with the design changes had a practical maximum range of 300km. It could carry either an HE warhead, a chemical warhead or nuclear warheads of 5 to 300 kilotons yield in the versions of the missile deployed with this system. Accuracy was greatly improved, with a stated accuracy of a 700m circular error probable (CEP) at maximum range (actual accuracy varied depending on crew training).

The 8K14 system was far more widely deployed within the Warsaw Pact than its predecessor, with most Warsaw Pact nations having at least six launchers in a brigade structure. The Soviets began to field them in brigades of nine at army and front level. The service life of the 8K14 was shortened by the development and introduction into Soviet Army service of the more advanced 9P117 mounted on the wheeled MAZ-543 8 x 8 chassis. Many brigades maintained a mixed structure of 2P19 and 9P117 launchers during the transition to the new launchers. Again, actual production totals have never been officially disclosed, but total production would appear to have been fewer than 200 vehicles.

Obiekt-817

The Obiekt-817 was a prototype based on the 2P19 which mounted a crane for self-loading. One major drawback to the 2P19 launcher was the large amount of support equipment required to carry out its operations. These included oxidizer trucks, fuel trucks, compressor vehicles, a mobile crane, nuclear warhead transport/preparation vehicles, and command and staff vehicles.

The idea behind the Obiekt-817 was that the missiles could be prepared some distance away from the launcher; with the built-in crane it would only require a missile transporter to deliver a fully fuelled and mated missile for the launcher to reload. This reduced the ‘footprint’ of the system and would enable it to fire one missile every two to three hours. The project was however scrapped with the development of the 9P117, as the initial version of the MAZ-543 launcher came with a very sophisticated self-loading capability.

T-10 BASED STRATEGIC MISSILE SYSTEMS

T-10 production was given another moderate prolongation by the adoption of the T-10 tank chassis for other non-heavy tank roles, which included the tank being used as the chassis for ATGM systems, as the basis for the RT-15 MRBM and the RT-20P ICBM strategic rocket systems, and for the testing of other specialized equipment such as the IMT mine clearing vehicle. None of the vehicles ultimately entered series production, but several were developed to prototype and service evaluation stage.

The T-10M was used as the basis for the huge SPU vehicles developed for the RT-15 MRBM and the RT-20P ICBM, developed over the period 1963 to1967 and paraded through Red Square as a warning to the West of the Soviet

Union's emerging long range nuclear attack capability. T-10M components were used in the production of the Obiekt-815, Obiekt-821 and Obiekt-825 transporter-erector-launcher vehicles, known in Russian as *samokhodno puskovaya ustanovka* (SPU). These vehicles had a total weight of 63–68 tonnes, had a crew of three, were powered by a diesel V-35T engine developing 760hp and had a maximum road speed of 20–40km/h depending on road conditions.

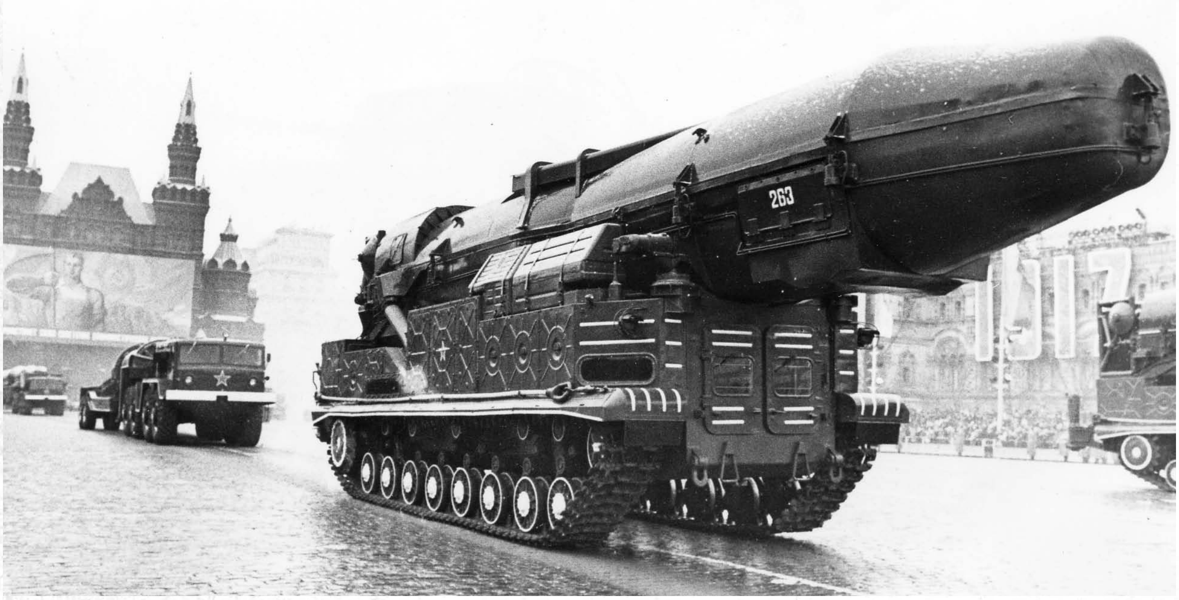
RT-15 MRBM

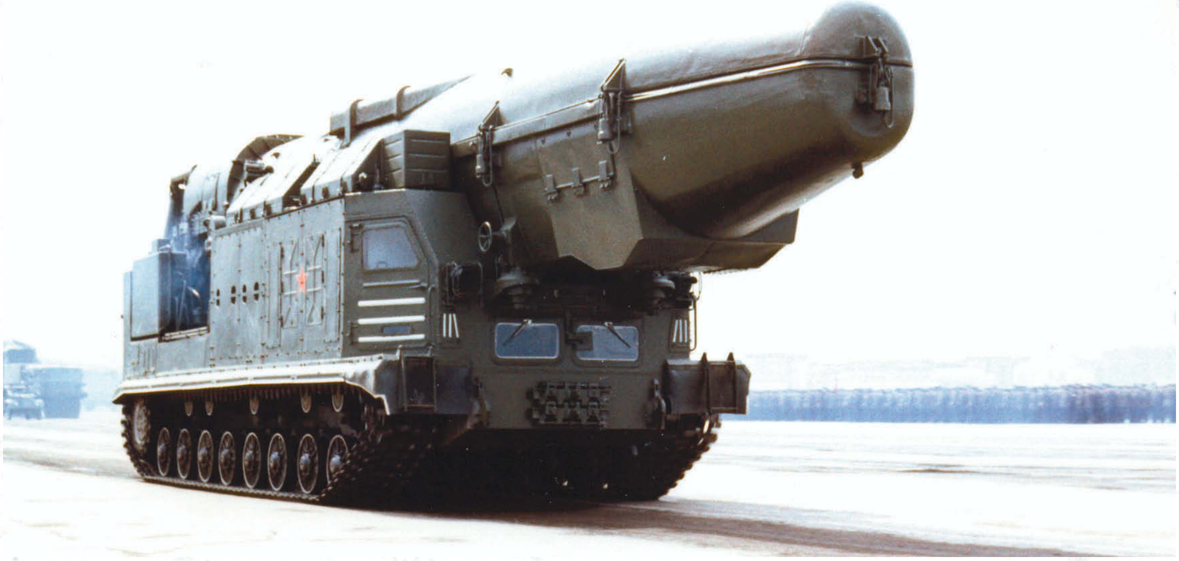
15P696 (RT-15) 8K96 Rocket System TEL Vehicle (NATO: SS-X-14 'Scamp'/'Scapegoat')

At the end of the 1950s, the OKB-1 design bureau under S. P. Korolev and the OKB-586 under M. K. Yankel began work on solid fuel rockets systems. Among the systems, OKB-1 developed the RT-2, RT-15 and RT-25 medium range ballistic missiles, the RT-15 being a mobile system mounted on a tracked SPU vehicle. In 1961–62, meanwhile, the OKB-586 developed the three-stage, 50 tonne launch weight RT-20 as an alternative to the RT-2. The project was however modified in 1963 to reflect a smaller, 30 tonne launch weight rocket and ultimately developed as the RT-20P, on the basis that the limiting factor was that 30 tonnes was the maximum load capability of the tracked TEL vehicle.

The 15P096 (silo launched) and 15P696 (mobile) launch systems for the 8K96 MRBM were developed in accordance with Resolution No. 316-137 TsK KPSS i SM SSSR dated 4 April 1961. The systems were developed based on the work undertaken at OKB-1 under the direction of chief designer

An RT-15 MRBM complex on Red Square, Moscow, 7 November 1967.

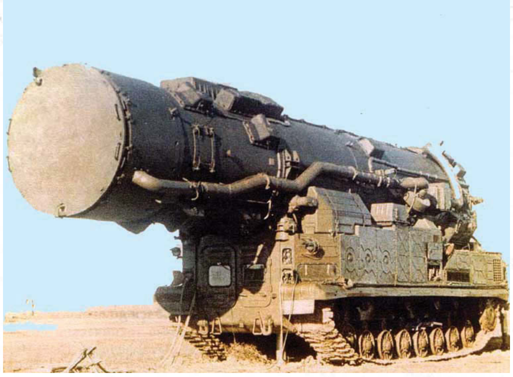




An Obiekt-815sp1 SPU vehicle for the 15P696 (RT-15) MRBM during practice runs at Khodinka field for the Red Square parades, Moscow.

S. P. Korolev on the silo launched solid fuelled RT-2 (8K98) rocket system. Resolution No. 316-137 envisaged the development of a mobile, shorter range MRBM variant of the system mounted on a tracked chassis, firing the 8K96 (RT-15) MRBM with a range of 2,500m. The intention was to develop a unified rocket system on the basis of the 8K98 (RT-2) ICBM, using stages (i.e. the rocket engines) 2 and 3 of the 8K98 missile for the 8K96 (RT-15) and stages 1 and 3 of the 8K98 missile for the 8K97 (RT-25). S. P. Korolev was in overall control of the co-ordination of development of these three missile systems with differing roles. The 8K96 (RT-15) system was to be armed with a 600Kt nuclear warhead (or 1.0Mt per other reliable Russian sources, probably a heavy and light warhead alternative), with an operational range of 2,500km. The 600Kt warhead weighed 535kg.

In accordance with the directive received in Resolution TsK KPSS i SM No. 316-137, a silo mounted system (15P096) and a mobile system (15P696) were duly developed. The 15U64 stationary (silo launched) launch system and its 15P096 mobile launch complex were developed at TsKB-34 (KB Spetsialnogo Mashinostroeniya) under the direction of V. F. Lender, with two prototype systems being built by the Bolshevik plant in Volgograd for trials to be conducted at State Central Polygon No. 4 located at Kapustin Yar to determine installation procedures, maintenance and practical operation of the system. Work on the silo launched version was, however, stopped at the stage of installing the systems, with further development of the mobile 15P696 MRBM system on its T-10 derived tracked chassis developed to prototype stage as the Obiekt-815.

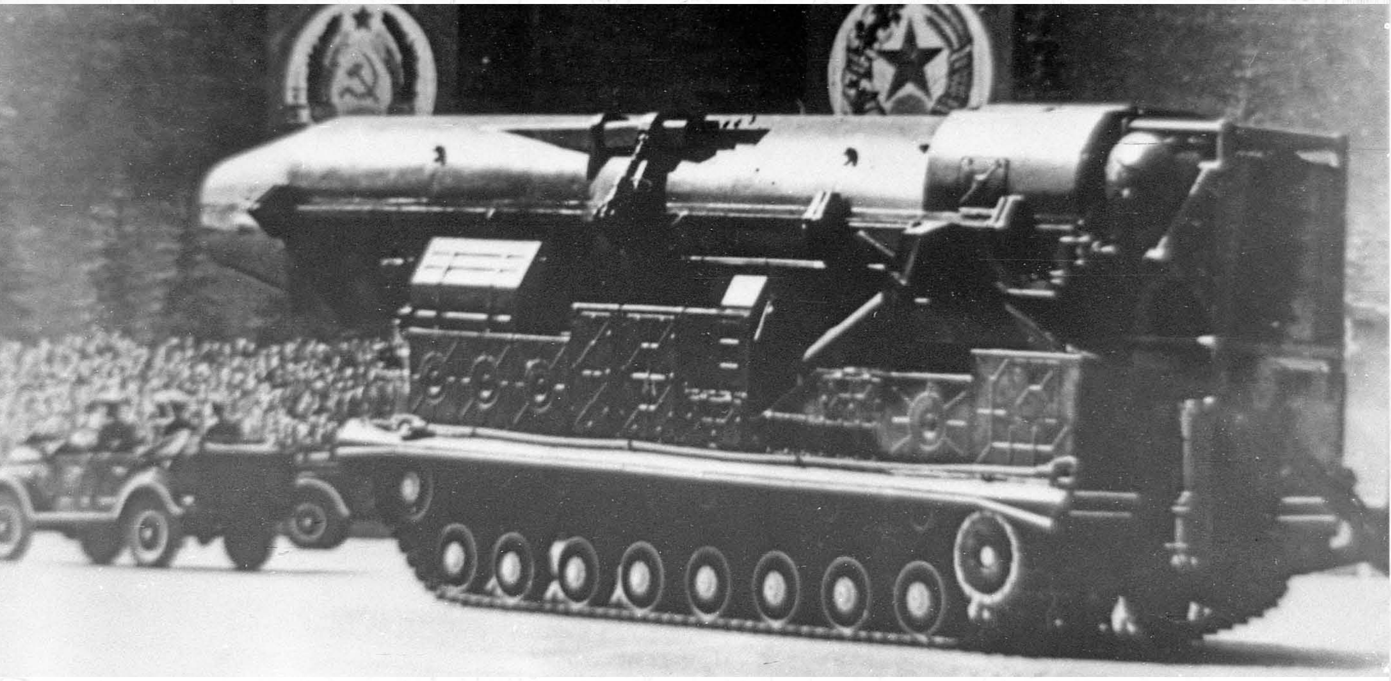


The second version of the RT-15 (8K96) with its modified Obiekt-815sp2 chassis and TPK container was developed and tested, but never shown in public.

Work on the mobile 15P696 rocket system was under the control of TsKB-7 (the KB of the Arsenal plant) and its chief designer Piotr. A. Tyurin; work on the launch system was undertaken at TsKB-34 (KBSM) under the direction of chief designer V. V. Chernetskiy. There were two stages of design. During the first stage in 1962, the KB-2 bureau and TsKB-34 developed the drawings of the missile system, while the KB-3 bureau at the LKZ (Leningrad Kirov) plant under the command of Iosef Kotin developed the working drawings of the TEL vehicle. The Kirov plant developed two prototype SPU vehicles on the Obiekt-815 tracked chassis, the Obiekt-815sp1 and Obiekt-815sp2. Testing was planned for the late summer of 1964. However; due to delays with the rocket fuel the test dates were moved back in accordance with the SM SSSR resolution dated 16 June 1963 (16 July in some Russian sources) pending the results of testing the 8K98 (RT-2) ICBM, of which the 8K96 (RT-15) was effectively a scaled down version. While awaiting these results, the Leningrad Machine Building Plant (Leningradsky Mashinostroitelny Zavod – LMZ) No. 7, named after Frunze (also and more easily recalled as the Arsenal plant), was instructed to prepare for series manufacture of the new 8K96 (RT-15) MRBM.

In accordance with the original TTTs, the second development phase starting in August 1965 required a re-design whereby the rocket should be launched without requiring removal from its transport-launch container. The schedule for test launches remained as before the spring of 1966. At the commencement of the second development stage, in August 1965, the Soviet MoD (MO SSSR) issued detailed TTTs for the rocket and its launch system based on the original paper designs completed in 1962. Fulfilment of the TTTs required significant re-design of the original concept. Specifically, the rocket was now expected to be launched directly from its TPK (*transportno-puskovye kontainer* – transport-launch container), mounted on the tracked chassis rather than being loaded onto a launch vehicle. This required a complete re-design of the TPK, its mounting, hydraulic lift mechanism and the hydraulic systems required for elevating the system. Due to changed TTTs much work was required, including a new PU launcher and associated systems. The volume of work was such that it could not be completed in time for the planned testing in the spring of 1966. Therefore with the agreement of the Soviet MO (Ministry of Defence), testing was undertaken in a continuous process as components became

This rare footage from a Soviet era documentary is one of the few available images of the second prototype RT-15 (8K96) and its Obiekt-815sp2 chassis, which has more than a passing resemblance to the RT-20P.



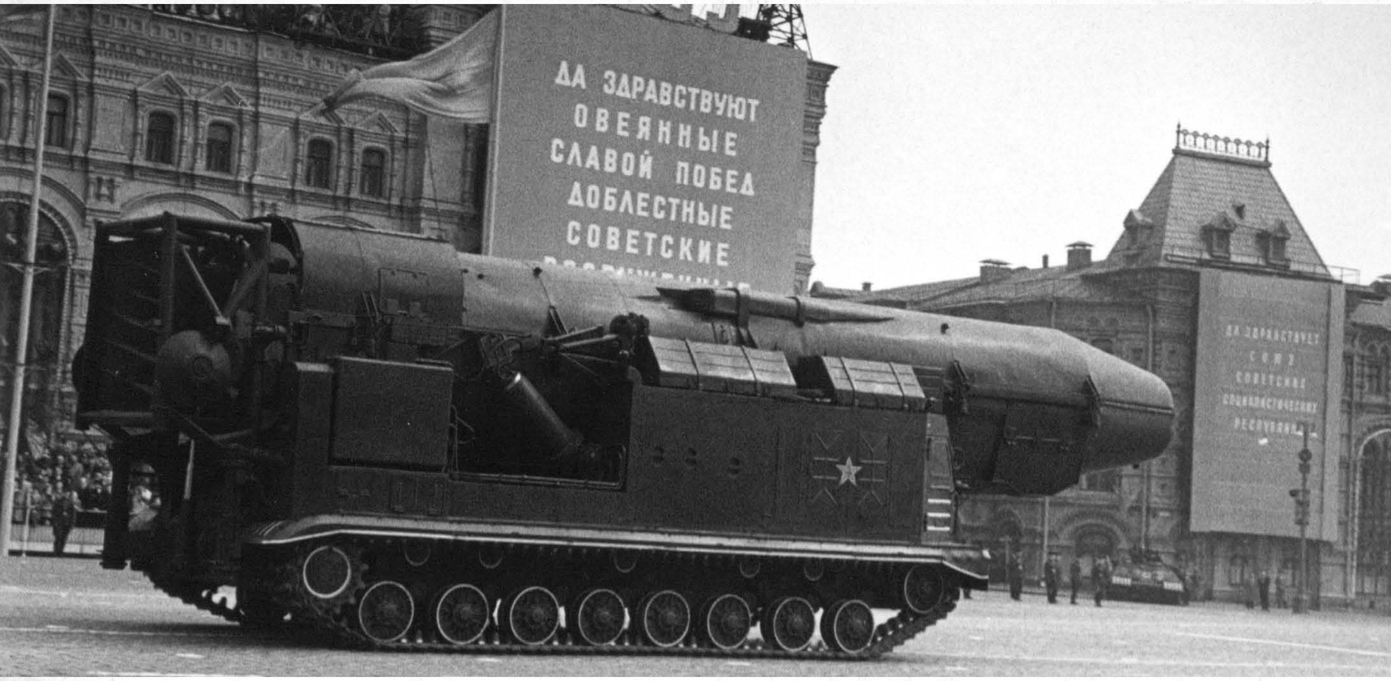
The RT-15 and its Obiekt-815sp1 SPU vehicle were initially known to NATO as the SS-X-14 'Scamp'/'Scapegoat'.

available. State testing was ultimately undertaken from early in 1967 until 1970, in which year the system was accepted into service with the Soviet MO for trials, which were undertaken in Belarus.

Not to miss a photo opportunity, however, the two first-generation tracked SPU vehicles for the 8K96 (RT-15) MRBM, Obiekt-815sp1 and sp2, were paraded through Red Square on 7 November 1965, mounting the original fibreglass TPK transport containers (i.e. not the later TPK transport-launch containers) for the 8K96 (RT-15) rocket.

RT-15 (8K96) Test Trials

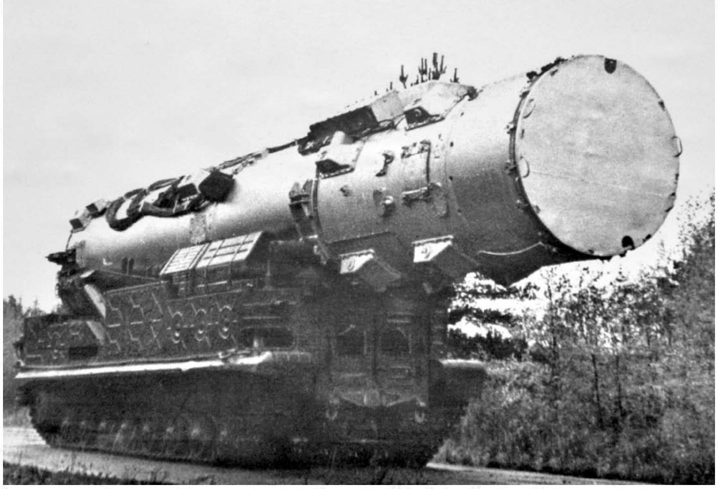
In accordance with an order from the Main Command of the Rocket Forces (GKRV; also known as GlavKom RVSN) dated 5 July 1966, military service testing of the new missile system was to be conducted by the 638th Rocket Regiment of the 31st Rocket Division located at Slonim and the 323rd Rocket Regiment of the 24th Rocket Division located at Gusev. The testing was to determine the operational characteristics of the new system, its RT-15 rocket and the 15U59 SPU vehicle on which it was mounted, including the time required to deploy, its overall mobility and maintenance requirements. The new MRBM rocket system was to be capable of independent operation, able to launch its rockets at any time of year and during daytime or at night without special preparation of launch positions.



An RT-15 MRBM on its Obiekt-815sp1 SPU vehicle chassis traverses Red Square, 1965.

Military trials with the 15P696 SPU vehicles with their 8K96 (RT-15) rockets continued throughout 1966, and in December 1966 the 50th Rocket Army was formed, made up of two rocket divisions, the 94th Rocket Regiment of the 23rd Rocket Division, formed on 1 December 1966, and the 50th Separate Rocket Division, formed on 10 December 1966. As part of the restructuring of the RVSN Strategic Rocket Forces in 1968–70, and their re-arming with MRBMs, the 50th Rocket Army was expected to re-arm with the Temp-S and RT-15 MRBM systems, and also with a silo mounted RT-15 system to be mounted in OS (*otdelniy start* – independent launch) silos.

Launch trials with the system began in November 1966, with testing of the second generation SPU vehicles (with launch directly from the TPK container) starting in 1969 and being completed in March 1970. During this period there were more than 20 launches from the second generation SPU vehicles, all conducted at Launch Pad No. 84 at the Kapustin Yar polygon. The final stage of testing of the 15P696 and its 15U59 SPU vehicle was conducted from the summer of 1969 at the Kapustin Yar polygon. The SPU vehicles were prepared at Launch Pad No. 105, where the 8K96 and 8K98 were previously tested, and then moved with their RT-15 rockets in their TPK containers under their own power to Launch Pad No. 84 for test launches from the SPU vehicles. The first complete system flight test was conducted on 9 February 1967.



The second version of the RT-15 (8K96) on the Obiekt-815sp2 chassis during evaluation trials.

In accordance with a resolution of the SM SSSR dated 6 January 1969, the 15P696 Rocket Complex and its RT-15 rocket was recommended for pre-service operational deployment with a single regiment of the RSVN, consisting of six SPU vehicles and associated support vehicles to be located at the Lesnaya rocket base, and with operational deployment to start from March 1970 to allow the RVSN troops to become familiar with the system. Production of the RT-15 rocket was delegated to the Leningrad Machine Building Plant No. 7 (LMZ): however, series production of the rocket was closed down in January 1969. While the system was deployed with the existing rockets for trials purposes, the RT-15 was nevertheless removed from service in 1971.

The first test launch of the new 8K96 rocket was undertaken on 9 February 1967, as a result of which the system was taken to the stage of state trials.

During the trials three 15U59 SPU vehicles were used, together with a single 15N809 command vehicle, 15V51 position preparation vehicle, three communications vehicles, two diesel electric generator vehicles, and 15T79, 15T81, 15T84 and 15T21P1 transport and crane vehicles, the latter required for a single launch or to work between SPU vehicles. Had the system been deployed, the 15P696 rocket system was to have consisted of six 15U59 SPU vehicles with 8K96 (RT-15) rockets in their 15Ya25 TPK containers, supported by a mobile command post consisting of a 15N809 Command Vehicle (MAZ-543), 15V51 Technical Preparation Vehicle (MAZ-543), a 'Relef' mobile communications system (three x MAZ-543), two 15N964 diesel electric generator vehicles (two x MAZ-543) and a crew accommodation vehicle (MAZ-543). Additional vehicles located at the launch site included a 15T81 reloading vehicle, 15T79 TPK loading vehicle, 15T84 transport vehicle, 15T21P Thermally Insulated Transport Vehicle and a command and targeting regulation vehicle, most being again based on the wheeled MAZ-543.

After the completion of state trials in March 1970, the RT-15 complex was recommended for service by the Ministry of Defence, with a single regiment of RT-15 MRBMs and their mobile SPU vehicles to be formed on the territory of Belarus for service evaluation trials purposes. The experimental service was undertaken with the 50th Separate Rocket Division, which participated in Red Square parades during this time. The SPU vehicles were used in operational trials by the two units that made up the 50th Rocket Army, namely the 94th Rocket Regiment of the 23rd Rocket Division, and the 50th Separate Rocket Division. Despite the fact that the rocket test flights and subsequent launches from the tracked SPU vehicles were successful, and the positive combat characteristics demonstrated by the 15P696 system and its 15U59 SPU vehicles during military evaluation trials, the decision was ultimately made not to take the vehicle into military service. The 50th Separate Rocket Division was reformed (on 1 July 1973) and its three 15U59 SPU vehicles withdrawn from service, as were the three that equipped the 94th Rocket Regiment of the 23rd Rocket Division of the same 50th Rocket Army.

The 15U59 SPU vehicles were based on the lengthened chassis of the T-10 heavy tank. The SPU vehicle proved to have reasonable off road characteristics, but only on hard surfaced tracks. With the SPU latterly intended to launch the RT-15 rocket directly from its TPK container and with reload rockets being loaded from their support vehicles without the need for any cranes, the system was considered practical and also safe in operation. The main failing of the SPU vehicle was its low normative chassis life, defined by the LKZ plant as 3,000–5,000km. This was compounded by the expected operational difficulty in servicing the chassis and hydraulic operated launcher systems, with access to many mechanical and hydraulic components requiring significant and time consuming disassembly of other components.

The later fibreglass thermo-insulated TPK transport-launch container, which contained the rocket during transport, short-term deployment and launch, was developed at TsKB-34 with the involvement of SKTB located at Khotkovo in the Moscow region that built the fibreglass containers. The KB at the Kaliningrad (railway) Wagon Building Plant – Kalininskogo Vagonostroitelnogo Zavod (KVZ) (chief designer L. D. Novikov) – developed the 15T83 thermally insulated vehicle and the 15T89 support vehicle.

The later 15U59 SPU prototypes differed significantly in appearance from the earlier prototypes, with the RT-15 mounted in an enlarged fibreglass TPK with a flat nose.

Series production of the RT-15 rocket was undertaken at the Leningradsky Mashinostroitelny Zavod No. 7 imeni M. V. Frunze. However, series production was shut down in January 1969, with previously built systems used until 1971.

The 15P696 system was to have consisted of six x 15U59 SPU vehicles with 8K96 rockets in their TPK transport containers, 15N809 command vehicle, two communications vehicles with 'A' and 'B' communications and a 15N964 diesel electric generator vehicle.

RT-15 (8K96) Red Square Parade Appearances and Non-Appearances

The two original prototype Obiekt-815sp1 SPU vehicles had their Red Square parade debut on 7 November 1965, and were seen again on 7 November 1966.

The second generation Obiekt-815sp2 SPU vehicle (with the rocket launcher directly from the TPK container erected into vertical launch position) was developed in cooperation with the SKTB in Khotkovo, which developed and manufactured the fibreglass container. For the second-generation system, the 15T83 thermo-insulated vehicle and 15T89 support vehicle were deployed with the system. The second generation Obiekt-815sp2 SPU vehicle, with its larger TPK container, looked similar to the RT-20P. It was not demonstrated on Moscow's Red Square.

NATO and Western Designations

The first generation SPU vehicle for the 8K96 (RT-15) MRBM was to become known to Western intelligence in May 1965, at which time the system received the NATO designation 'Scamp'. The system was paraded on Red Square in November 1965 and again in November 1966. From 1968 NATO gave the system the designation SS-X-14 'Scapegoat'. Within a few years, it became understood that the rocket systems as described by NATO as 'Scamp' and 'Scapegoat' were one and the same, hence the double-barrelled nomenclature used from the early 1970s.

RT-20P ICBM ROCKET SYSTEM

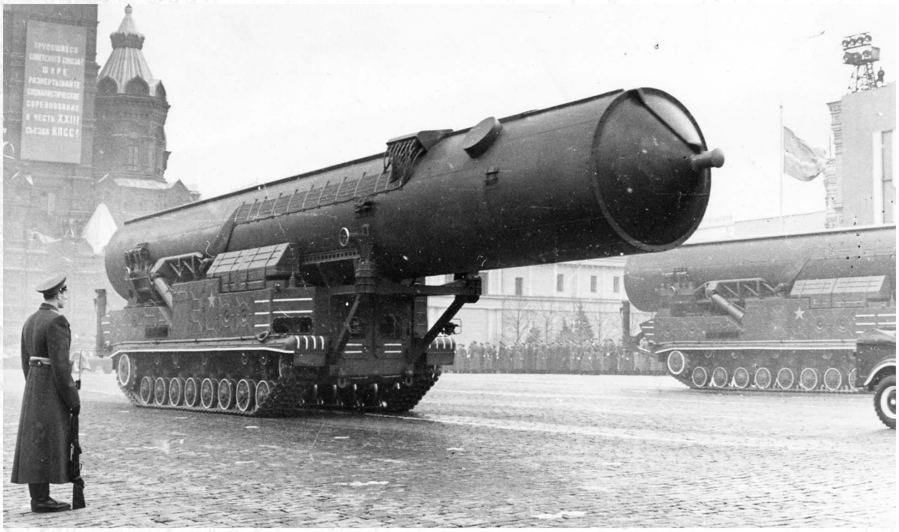
15P699 8K99 Rocket System with RT-20P ICBM (NATO: SS-X-15 'Scrooge')

At the beginning of the 1960s, the Soviet government made a decision to develop an ICBM with a launch weight limited to 60 tonnes, and further to develop a land-mobile variant of the rocket system mounted on a tracked SPU chassis. The latter was developed in the form of the 'Gnom' and RT-20P land mobile ICBMs, mounted on tracked chassis derived from the T-10 heavy tank. Only the latter RT-20P was manufactured, and then only for trials evaluation purposes. Although neither system entered series production, the technology developed and investigated in their respective designs was instrumental in the future development of the RSD-10 'Pioner' (NATO: SS-20) and later 'Topol' (NATO: SS-25) and Topol-M (NATO: SS-27) land mobile ICBM systems. The 15P099 (silo launched) and 15P699 (mobile) launch systems for the 8K99 (NATO: SS-X-15 'Scrooge') ICBM were developed in the mid 1960s. The RT-20P was a mobile variant of the RT-20 ICBM mounted on a tracked mobile SPU vehicle, developed concurrently with (and as a rival to) the 'Gnom' ICBM project. Both systems were developed in response to testing in the US from 1 February 1961 of the land mobile nuclear armed Minuteman-1A MRBM with a 9,000km range.

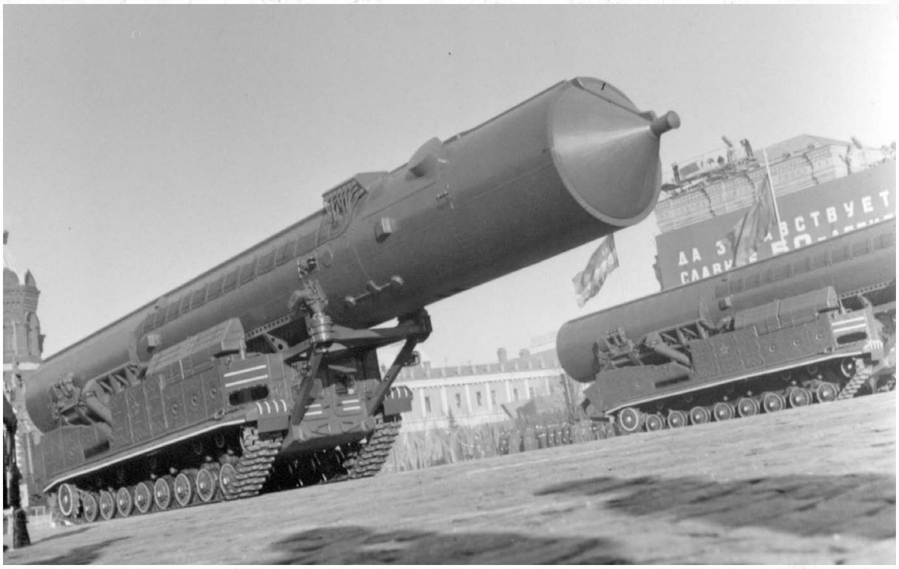
The 8K99 ICBM was developed at the Yuzhnoe design bureau (KB) in Dnepropetrovsk, Ukraine in 1964. The first variant of the RT-20 (8K99) was a three-stage solid fuel rocket system, but in order to reduce the lift-off weight the decision was taken to modify the rocket as a two-stage system, the RT-20P, with a solid fuel first stage and the second stage liquid fuel. The decision was taken in order to provide a mobile version of the rocket, mounted on a tracked SPU based on the T-10M (Obiekt-821) tank chassis, which could not transport a rocket with a total weight of more than 30 tonnes (i.e. the second stage was fuelled immediately before launch).

Official development of the project began in accordance with a resolution of the SM SSSR dated 24 August 1965. The design drawings for the 15P099 fixed silo mounted and 15P699 tracked SPU mounted rocket systems were completed in 1966.

The RT-20 three-stage solid fuel 50 tonne launch weight MBR (ICBM) was developed at OKB-586 from 1961 to 1962 as an alternative to the RT-2, then concurrently in development at OKB-1. In 1963 work began on a mobile version of the system that ultimately took precedence over the original silo launched RT-20. The smaller, now two-stage ICBM with a 30 tonne launch weight was developed at the KB Yuzhnoe under the leadership



The RT-20P (NATO: SS-15 'Scrooge') was the Soviet Union's first truly independent mobile ICBM system. It had its public debut on Red Square on 7 November 1965.



The RT-20P SPU vehicle, as regularly paraded on Red Square in the late 1960s, was based on an extended and significantly modified T-10 chassis.

of Mikhail Yangel from December 1964 on the basis of a VPK pri SM SSSR resolution dated October 1964, which stipulated the development timetable for the RT-20P under the index 8K99. The first test launches were scheduled for November 1965.

In reality, the design drawings were completed in November 1964, and in agreement with the TTTs of the Soviet Ministry of Defence (MO) an original two-stage, combined fuel mobile ICBM system was developed that transported a 'small' diameter ICBM safely within a fibreglass TPK transport container. The 8K99 had an unusual mixed fuel propulsion system consisting of a solid fuel first stage (a 15D15 rocket engine developed at OKB-586) with 16.5 tonnes of fuel combined with a liquid fuelled second stage – basically an 8K94 rocket stage. The complex arrangement was developed in order to minimize the rocket weight, allowing the SPU vehicle to transport the rocket to any desired launch location more easily, with the second stage being fuelled at the launch site. The mobility of the system was intended to make up for the delay and complexity in preparing for launch at site. In reality, it was the complex nature of the field operation and maintenance of the 8K99 rocket and its SPU vehicles that would lead to the project being ultimately abandoned.

The 8K99 rocket featured alternative multiple warhead thermo-nuclear warheads, a 0.4Mt light type, with a range of 5,000–7,000km and a 1.0Mt heavy type with a range of 9,000–11,000km. Other sources state 1.5Mt heavy warhead with 5,000km range and 0.5Mt light with a longer, 'ICBM' range, which would seem more logical.

The first-stage solid fuelled rocket with its 15D15 rocket engine was developed for production at a newly formed OKB at the Pavlograd Mechanical Plant – Pavlogradsky Mekhanichesky Zavod (PMZ). Test firing of the 15D15 rocket engine for the first stage began in April 1965.

Work on the tracked SPU self-propelled transport and launch vehicle began at the design bureau for special vehicles – Konstruktorskoe Bureau Spetsialnikh Mashin (KBSM) – under the direction of B. G. Bochkov, with the rocket design work being carried out at KB Mashinostroeniya and NII-130. The mobile version was the base version of the RT-20P, though several silo mounted variants were also designed as alternative launching means.

The mobile RT-20P was first paraded in public on Moscow's Red Square on 7 November 1965, when two Obiekt-821 SM-SP21 (15U21) SPU vehicles with mock-up missiles were paraded through Red Square, where foreign military attachés doubted their ICBM credentials. Meanwhile, testing of the RT-20P rocket began at the Plesetsk polygon in the summer of 1967 and continued until 6 October 1969, when further development was curtailed by resolution of the SM SSSR after 12 test launches, the technical reason for this being the difficulties encountered in fuelling the liquid fuelled second rocket stage mounted on top of the solid fuel first stage in field conditions.

Experiments with solid (initially powder) rocket fuel systems began at the OKB-1 bureau with the RT-1, followed by the solid fuel RT-2 from which was derived the RT-15 MRBM and RT-20 ICBM. The use of solid fuel systems allowed the rockets to be prepared for launch more quickly, maintained in ready to launch position, and also gave the possibility of the systems being mounted on mobile SPU vehicles.

A 15P699 PGRK land mobile rocket complex would have consisted of six 15U21 (SM-SP21) tracked SPU vehicles with their RT-20P (8K99) rockets, 15N809 command vehicle, two 15N1034 position preparation vehicles, two 15P694 diesel electric generator vehicles and a 'Relef' communications system mounted on three vehicles as for the RT-15, with the wheeled MAZ-543 being the default wheeled chassis for the support vehicles.

The thermally insulated launch container was hydraulically lifted to the vertical position for rocket launch. The suspension was locked and the launch platform was levelled to within +/- 10° by means of moving the SPU vehicle, with finer adjustment done by moving the gyro stabilized launch platform.

The RT-20P launch sequence required considerable thought, as the standard 'open' scheme with the first rocket stage fired at launch was unacceptable. Either a launch pad was required to accommodate the force of the rocket launch, which inevitably would reduce the system's rapid deployment and movement capabilities, or a special gas-ejection system was required, as used on submarines, to blast the rocket clear of the launch system TPK container before the 'hot' first-stage rocket engine was ignited. This would require considerable modification of the SPU vehicle and would add additional weight, reducing the mobility of the SPU vehicle. Much time was spent on the latter 'cold launch' system, whereby a gas vapour system ejected the rocket, as on the US 'Polaris' submarine based rocket system. TsNIIMash recommended acceptance of a combined start system, as used on the RT-2 (silo launched) rocket, but the system was complex in operation for a mobile rocket system. OKB-586 (the Yankel OKB) meanwhile recommended their original solution, utilizing a gas vapour ejection system to eject the rocket from its TPK before launch of the first 'hot' rocket stage. This 'mortar start' system was adopted for the RT-20P and was built at NII-125 under the direction of B. P. Zhukov.

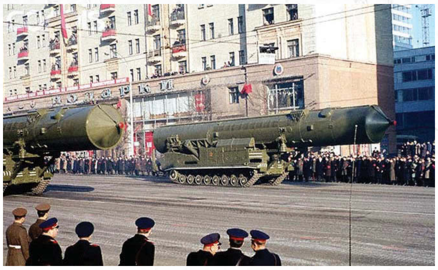
Development of the RT-20P rocket system was officially sanctioned in accordance with a resolution of the SM SSSR dated 24 August 1965. Design drawings for the silo mounted 15P099 and mobile 15P699 were undertaken over the next several months, and in accordance with government resolution No. 583-186, dated 26 July 1966, a state commission was established to oversee flight trials of the 8K99 rocket, with a total of 35 test launches planned. In the event, testing was delayed by more than a year and started badly in part due to the rushed development of the system. Of 48 test stand ignitions of the 15D15 engine, only 28 were successful. Flight test began at the Plesetsk polygon from 27 September 1967, with eight (some sources state 12) launches conducted between 24 October and 1 November, during which test launches rockets 4L and 5L were destroyed in explosions. Nevertheless, despite the testing difficulties encountered, VPK Resolution No. 32, dated 2 February 1968, was to build and deliver to the MO (Soviet MoD) rockets and SPU equipment to allow trial service testing of the system of one PGRK (i.e. one land mobile rocket complex) of 15P699 systems.

After a two-month delay due to reworking of the original system and correcting design errors highlighted during stand rocket engine and subsequent test flights, tests resumed from February 1967 to October 1968 with another seven rocket test launches (rockets 7L, 8L, 9L, 10L, 11L, 14L, 15L), of which only three were entirely successful. During at least one test launch the rocket system overturned on launch, destroying the TPK container and damaging the SPU vehicle. Testing nevertheless continued, until series production of the rocket was curtailed in accordance with Government Resolution No. 12-6 dated 6 January 1969, largely due to work already under way in parallel on development of the Temp-2S, which was expected to fulfil the role envisaged by the RT-20P.

The official reason for curtailing further development of the 8K99 was the unsuccessful launches. However, it was also partly to do with the impracticality of utilizing a mobile SPU system with a solid fuel first stage but requiring the liquid fuelled second stage to be fuelled at site before launch, together with reluctance by the Soviet Rocket Forces to take on the associated operational support logistics that went with the new system and its complex fuelling arrangements. The dislocation and relocation between launch points, separate storage requirements for differing fuels, and the associated requirements of repair, maintenance, communications, security provision, etc. were just too complex overall.

Further test launches were undertaken at the Kapustin-Yar polygon in July–August 1969 (presumably with rockets already produced at the time of the curtailing of production in accordance with Resolution No. 12-6 dated 6 January 1969). Rockets 12L, 13L and 16L were successfully launched, as a result of which there was potential to recommence test flights with additional new built rockets in 1970, since of 19 launches there had been only three failures and these for 'fixable' reasons. The Soviet MoD remained reluctant to embrace the use of a land mobile ICBM with a mixed fuel propulsion system. Yankel suggested as an alternative using the already developed and increasingly reliable 8K99 rocket in silo installations in place of the 8K63U and 8K65U; however, all work on the RT-20P and its 8K99 ICBM rocket were curtailed by a government resolution dated 6 October 1969. All the design and construction diagrams were sent to the curiously named Institut Teplotekhnika (the Institute for Heating Equipment) that controlled rocket development in the Soviet Union, and retains overall control of strategic rocket development and production to the present day. Blame for the RT-20P (8K99) was of course allocated to all and sundry, but one of the reasons that later appeared for the lack of ultimate success of the project was the limited resources available to drive it forward, due to the concentration of rocket engineers on other more strategic systems such as the R-36 and R-36M liquid fuelled silo launched ICBMs, and parallel and in some cases conflicting requirements to develop other systems including the UR-100, 11K67, 11K68 and 11K69 – in other words, insufficient resources for the number of parallel projects in hand.

The RT-20P was the first solid fuel (and first and only combined fuel system) rocket, and the first mobile ICBM developed by engineers at OKB-586. Though ultimately not accepted for military service, the RT-20P, its development and testing gave the engineers at OKB-586, and indeed in the Soviet Union as a whole, valuable experience in rocket, rocket propulsion system and SPU vehicle development. Though the RT-20P was abandoned

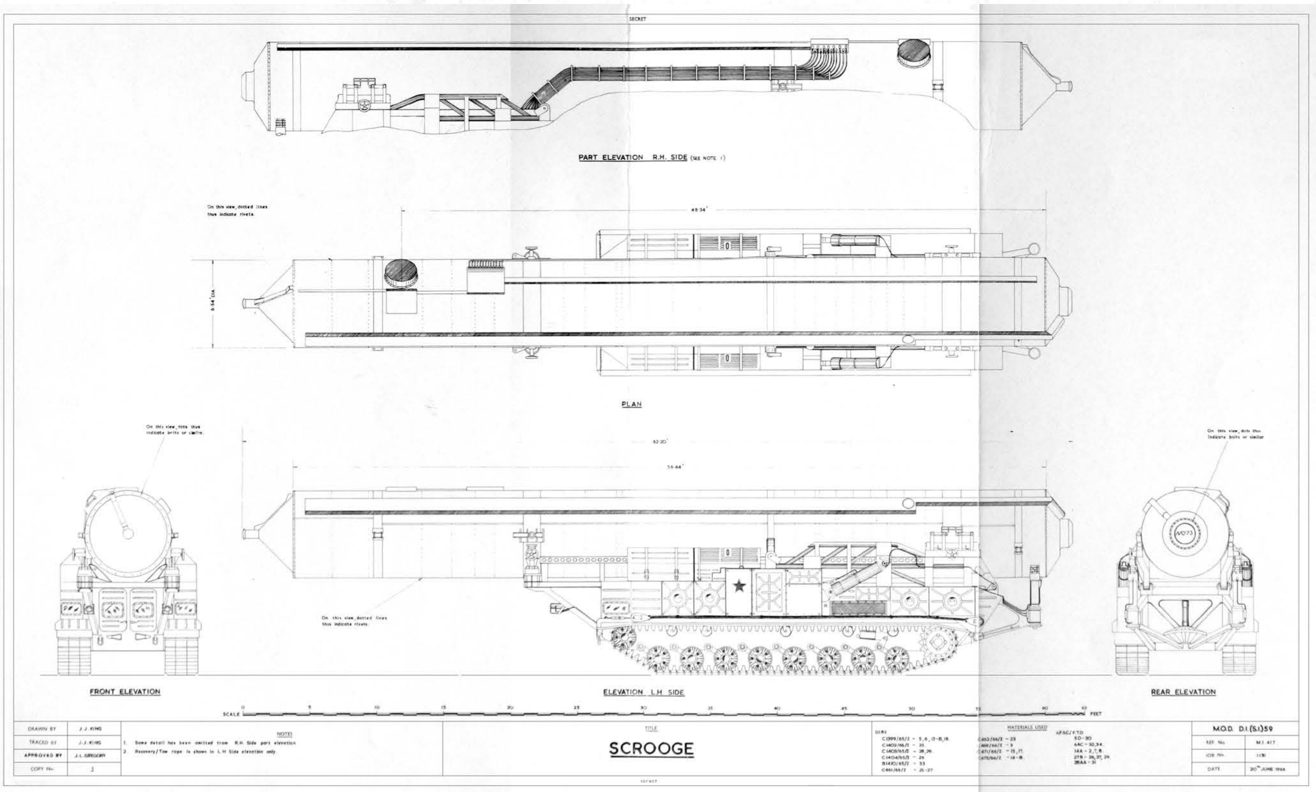


A rare colour photograph of RT-20P SPU vehicles moving towards Red Square, 7 November 1966.

and no land mobile (i.e. SPU mounted) solid fuel ICBM would be introduced into Soviet service until the introduction of the 'Topol' (NATO: SS-25) on its wheeled MAZ chassis many years later, NII-1 under the command of Alexander Nadiradze in 1965 developed a short range mobile OTR (Operativno – Takticheskogo), the Temp-S, utilizing the solid fuel systems developed for the RT-20P. The NII-1 bureau subsequently developed the top secret Temp-2S ICBM, based on the technology used in the Temp-S OTR, which was in turn derived from work on the abandoned RT-20P ICBM. Although the Temp-2S ICBM was also not developed to the stage of series production, the Temp-2S was developed into the RSD-10 'Pioner' (NATO: SS-20) MRBM and subsequently the Topol (SS-25) and Topol-M (SS-27) ICBMs, mounted respectively on the MAZ-547, MAZ-7917 and MAZ-79221 multi-axle wheeled chassis. In other words, the current Topol-M on its MAZ-79221 chassis is a direct descendant of the tracked RT-20P.

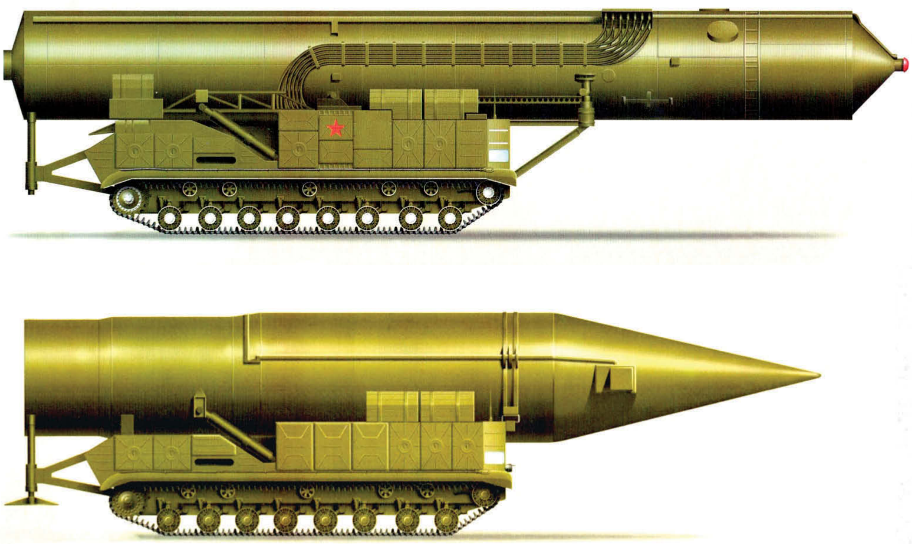
RT-20P Launch Sequence

Within three minutes of receiving a launch command, the TPK container was elevated to vertical launch position, the TPK cover was lifted off and the RT-20P (8K99) rocket ejected from the TPK by a gas-vapour mix, with the



SECRET
PART ELEVATION R.H. SIDE (SEE NOTE 1)
On this view, dotted lines thus indicate rivets
PLAN
On this view, dots thus indicate bolts or similar
ELEVATION L.H. SIDE
FRONT ELEVATION
REAR ELEVATION
SCALE
FEET
DRAWN BY J.J. KING
TRACED BY J.J. KING
APPROVED BY J.L. GREGORY
COPY No. 3
NOTES
1. Some detail has been omitted from R.H. Side part elevation
2. Recovery/Tow rope is shown in L.H. Side elevation only
TITLE
SCROOGE
MATERIALS USED
M.O.D. D.I.(S.I.)59
REF. No. M.I. 417
JOB No. 1131
DATE 20th JUNE 1966
SECRET

An interesting UK MoD drawing based on the first parade appearance of the RT-20P in November 1965. The chassis was designated SM-SP-21, the system designation was RT-20P. (National Archives, Kew)



TOP: The T-10 based SM-SP-21 SPU vehicle was impressively large.

BOTTOM: vehicle for the RT-20P was also considered for the prospective 'Gnom' ICBM, perhaps humorously designated because it was far from gnome-sized.

rocket being ejected from the container at a launch speed of 30m/s. At a height of 10–20m above the TPK, the first-stage rocket engine ignited, followed 11 seconds later by the ignition of the second stage.

RT-20P (8K99) System Testing

Testing of the RT-20P and its complex combined fuel and launch systems was carried out in two stages, commencing 2 January and 16 September 1963 at the NII No. 53 polygon of the Rocket and Cosmonautical Forces of the Ministry of Defence (MO) at Plesetsk in the Arkhangelsk (Arkhangel) region, which was re-organized as a polygon for the purpose. Testing of the RT-20P (8K99) was undertaken at Pad Nos. 157 and 158 and Technical Position No. 171A. Ultimately, in March 1966 a new testing command was formed under Colonel P. P. Sherbakov.

Red Square Parade Appearances

In 1965, the decision was taken at the highest political level to demonstrate the TU/SPU vehicles of the RT-15 RSD (MRBM) and RT-20P MRB (ICBM) for the benefit of the Soviet hierarchy, the Soviet Rocket Forces and the foreign press. The two newly built 15U21 (Obiekt-821) SPU vehicles (effectively the prototypes for the RT-20P then still under development) were therefore trundled through Red Square on 7 November 1965 in celebration of the 50th anniversary of the Russian revolution. NATO designated the new RT-20P system SS-X-15 'Scrooge'. The RT-20P (or more precisely its tracked SPU vehicle and TPK container) paraded through Red Square within a month of the system undergoing its first test flights. Although both vehicles were a work in progress, it would appear that the Obiekt-820 was primarily designed as a TU transporter-installer vehicle, while the Obiekt-821 was modified as a fully-fledged SPU transporter-erector-launcher vehicle.

MULTIPLE TRACKED ROCKET TEL CHASSIS

For the development of the Temp-S2M ICBM, it was clear that the newly available 5-axle wheeled MAZ-547 would not be capable of acting as the TEL vehicle for missiles with a launch weight of 50 tonnes. Accordingly, at the request of the NII-1 rocket design bureau, VNII-100 (VNII Transmash), in co-operation with a number of Soviet institutes, developed several variants of tracked SPU (TEL) chassis for the Temp-S2M on the basis of different armoured vehicle chassis. Three were based on the Obiekt-432 (T-64) MBT, but two were based on chassis developed on the basis of the T-10 tank and its mechanical components. One of these was based on the Obiekt-821 SPU of the RT-20P, the other a composite chassis combining an Obiekt-821 tracked chassis with a wheeled semi-trailer arrangement based on that used with the MAZ-537.

Ultimately, VNII-100 determined that development of a tracked TEL vehicle with the required SPU parameters within the given total 65 tonne weight limit was not technically possible. For future work, a duplex tracked chassis with a total weight of 70 tonnes was proposed. To save time developing such future TEL systems for the Temp-S2M, it was further suggested that a working model prototype be built on the basis of the Obiekt-821.

To this day, the only publicly released evidence of these highly secret ICBM SPU vehicles is an archive film from the LKZ plant, film that apparently depicts what may be the Obiekt-825, a tracked SPU vehicle similar in appearance to the Obiekt-821.

'GNOM' ICBM SPU VEHICLE

The T-10M was also used as the potential chassis for the 'Gnom' ICBM. When in the early 1960s the supreme leadership of the Soviet Union had ordered Soviet rocket designers to embark on the development of an MBR (ICBM) with a maximum launch weight of 60 tonnes, a mobile variant of which was to be mounted on a tracked chassis, two mobile MBRs were developed as part of the resulting rocket development programme. One was the RT-20, the land mobile RT-20P version of which was built and paraded through Moscow's Red Square for the attention of the Soviet public and the foreign press. The other, far more advanced and far more obscure alternative was the 'Gnom', which remained a design study that did not progress to prototype stage.

The 'Gnom' system was developed from the end of the 1950s at the Kolomna Machine Building Design Bureau (Kolomenskoye Konstruktorskoe Bureau Mashinostroeniya (KBM)) under the direction of Boris Shavirin, working with a design group that included Dmitry Ustinov and in co-operation with the TsIAM and TsAGI design institutes. The rocket engines for the 'Gnom' were developed at OKB-670 of the Ministry of Aircraft Production under the direction of Mikhail Bondaryuk. The 'Gnom' was unique in being intended as a supersonic ICBM. The 'Gnom' was a three-stage ICBM, the first stage with its *pryamotochnogo* (ramjet) solid fuel launch rocket engine with four boosters being complemented by solid fuel second and third stages. The booster assisted first stage was planned to take the rocket supersonic to an envisaged Mach 1.75, followed by the second and third stages, all burning solid fuel mix.

As with the RT-15 and RT-20P, which were both built for evaluation purposes, the envisaged 'Gnom' was to have been transported on the same T-10 derived SM-SP21 chassis as used for the RT-20P, with some minor modifications. The 16.4m long, 2.60m diameter, 29 tonne launch weight 'Gnom' missile was significantly larger than the RT-20P, however, as inevitably was its TPK transport-launch container mounted on the chassis.

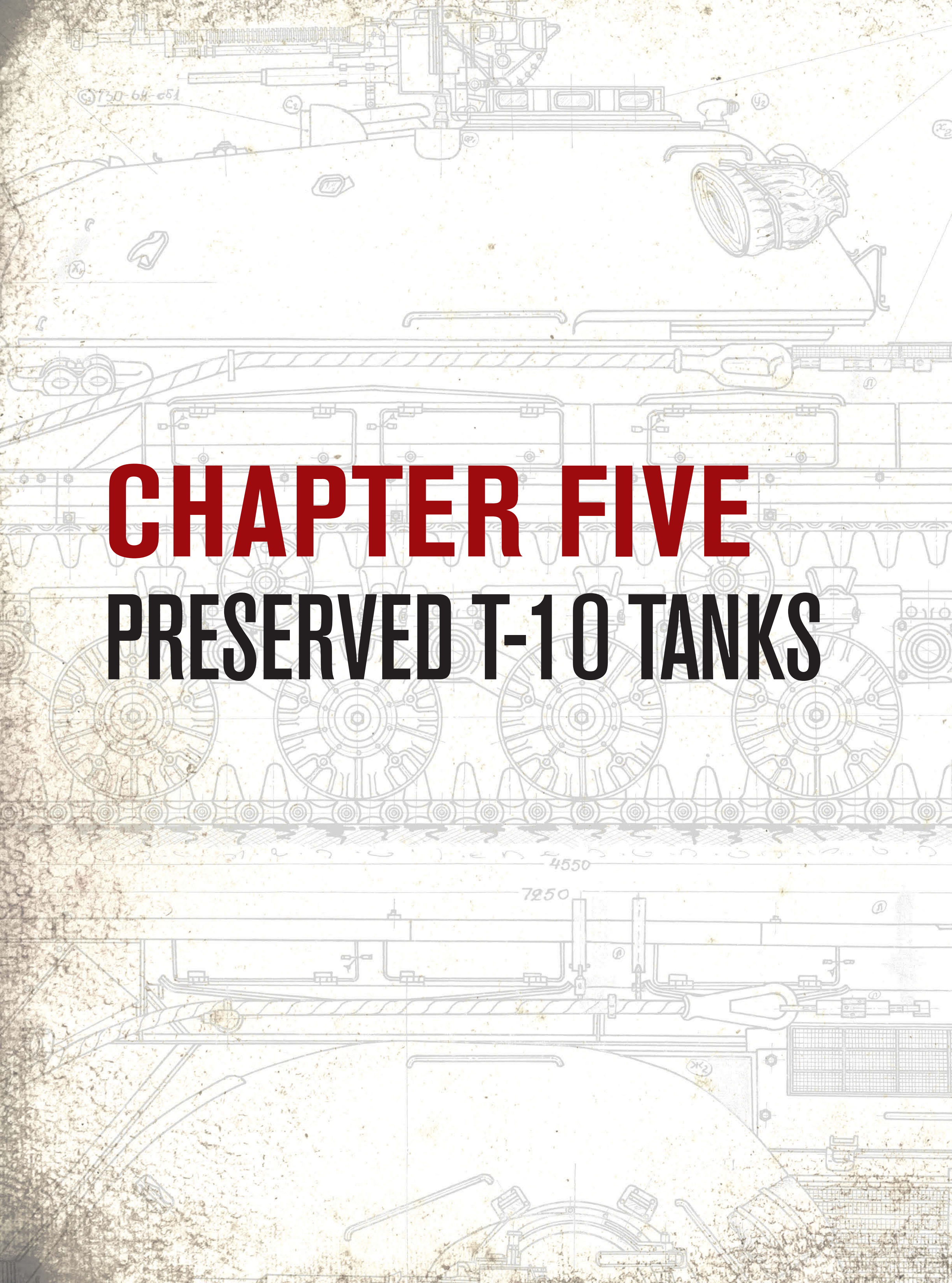
The design work for the tracked SPU vehicle for the 'Gnom' was undertaken by the KB-3 design bureau at the LKZ (Kirov) plant in Leningrad, under the direction of Iosef Kotin. The projected overall weight of the SPU with rocket was envisaged at 60 tonnes. The large diameter TPK transport-launch container would disguise what was actually a small calibre rocket with four rocket boosters.

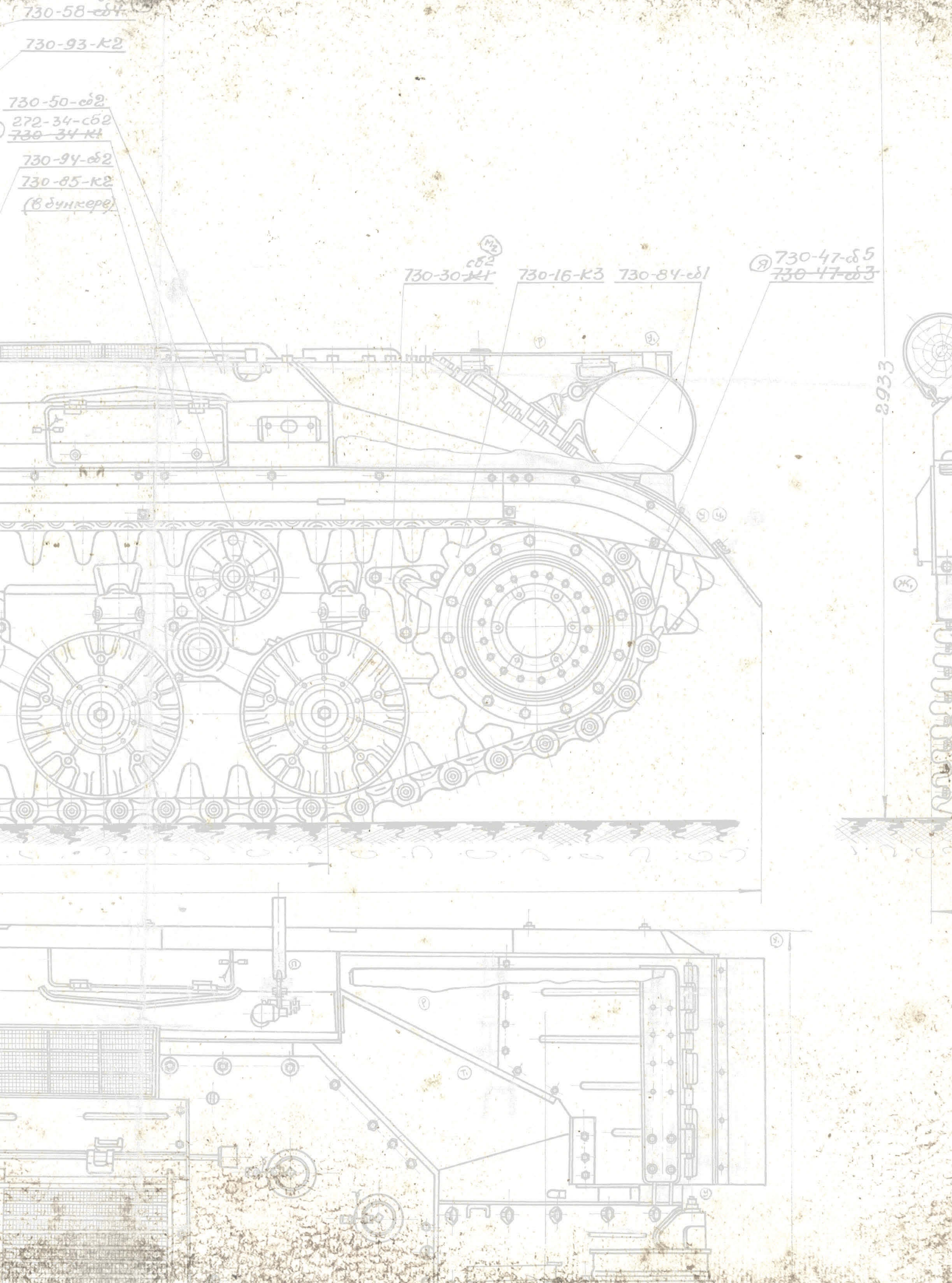
Had the 11,000km range 'Gnom' ICBM been taken into service, ten SPU vehicles were intended for deployment in each Soviet rocket regiment. Other sources indicate that between ten and 20 launch and reload vehicles were envisaged, with a storage life of around ten years, to be located within the environmentally controlled TPKs.

The first firing of the new rocket engine to be used on the 'Gnom' was undertaken on a test pad at Turaevo at the end of October 1965. Though the 'Gnom' was developed concurrently with the rival RT-20P and the rocket system had unique design characteristics, it was technically unfeasible with technology available at the time, and the project was abandoned at the end of 1965. The 'Gnom' therefore remained a design study developed in drawing and prototype development model form only.

CHAPTER FIVE

PRESERVED T-10 TANKS

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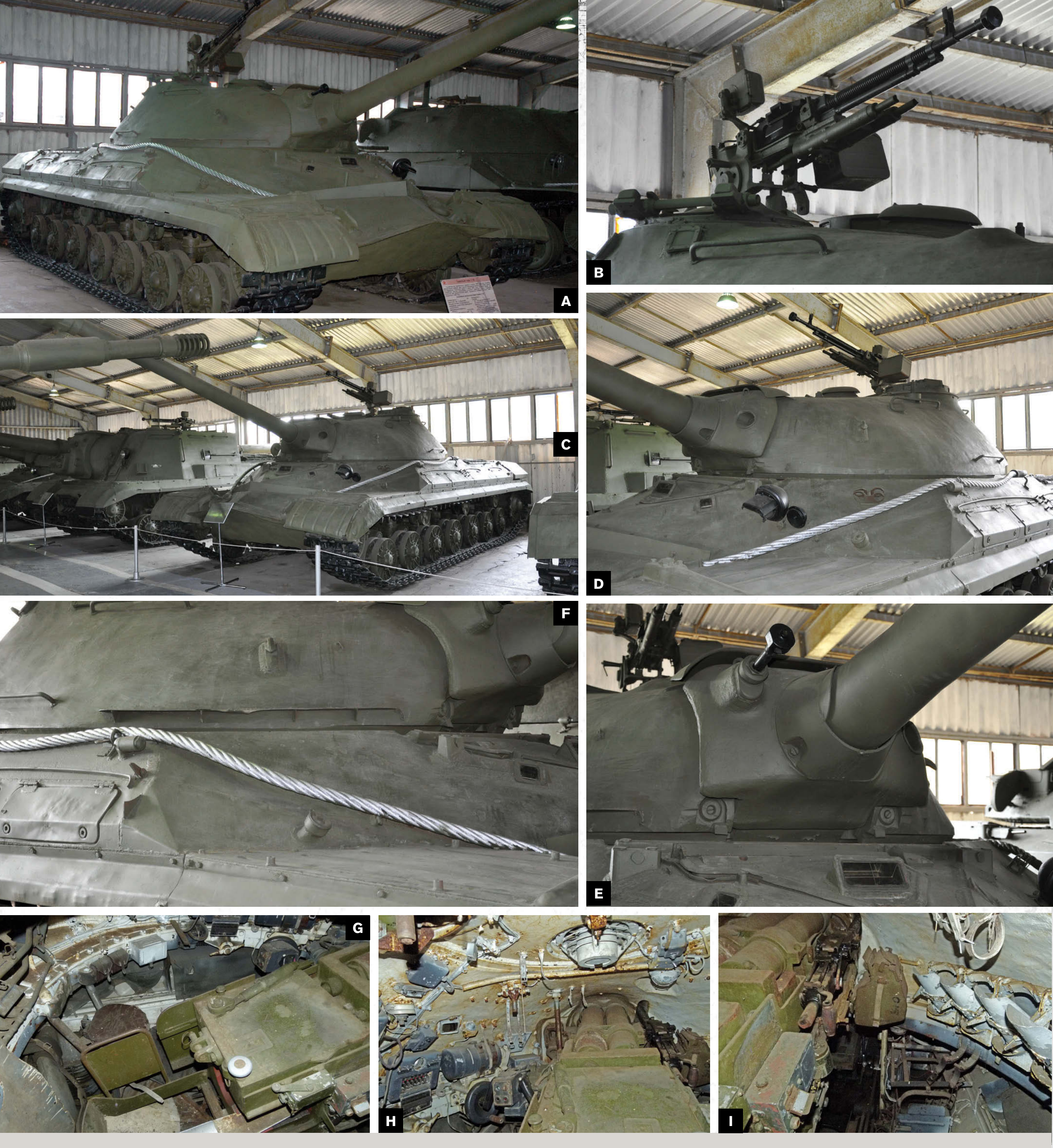
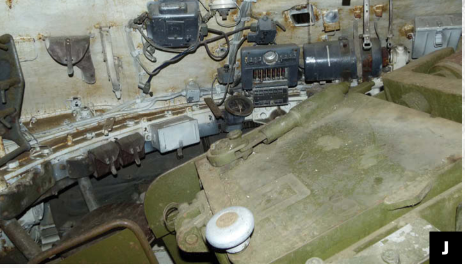
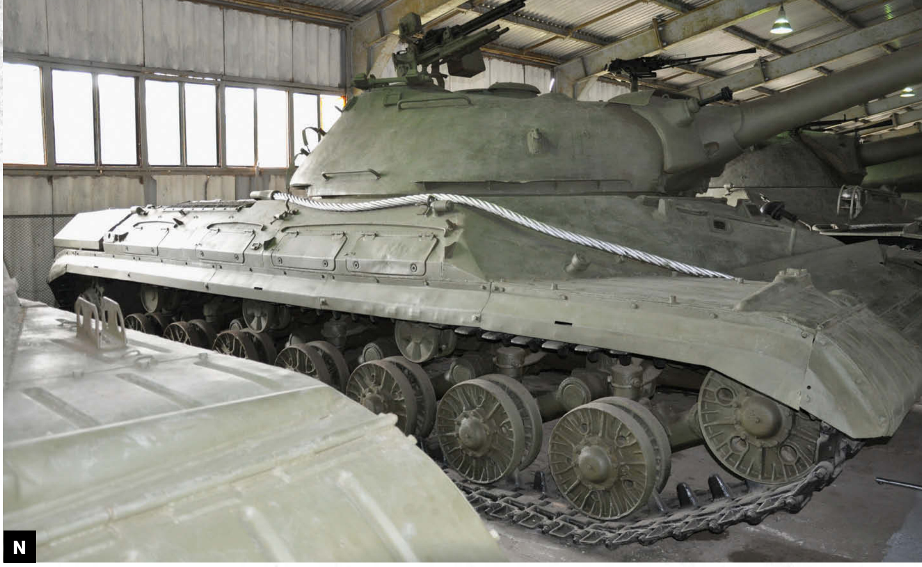
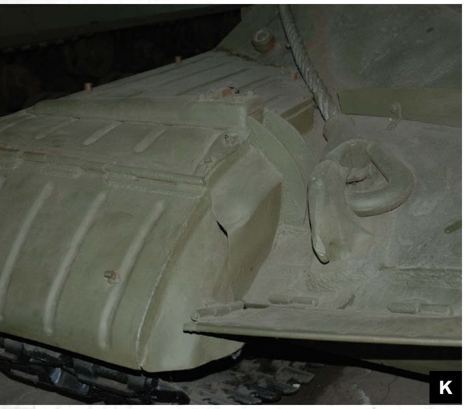


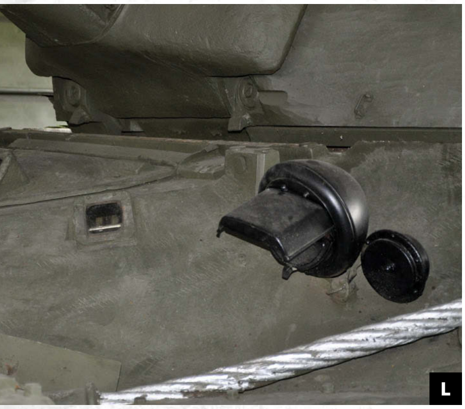
T-10 (T-10A) KUBINKA TANK MUSEUM

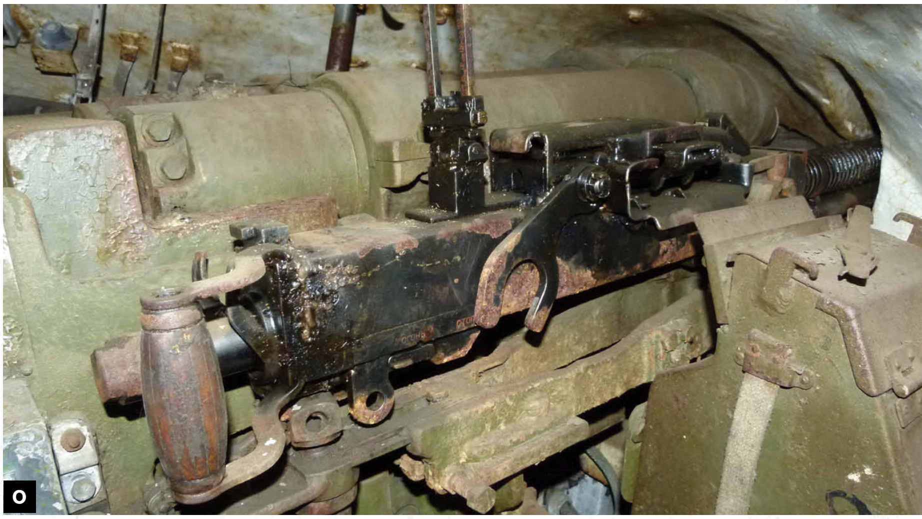
(A) The T-10 (T-10A) located at the Kubinka Tank Museum is an early production T-10 that was later modified for additional proving trials at Kubinka. As such, though nominally an early T-10, the tank is not entirely a standard production model and is a hybrid example, a feature that it shares with many tanks located at Kubinka, which was, and remains, primarily a tank proving ground with an attached museum. **(B)** The T-10, T-10A and T-10B were armed with the 12.7mm DShKM heavy machine gun for both co-axial and anti-aircraft armament. **(C)** The T-10 at Kubinka is located next to the much more extreme IS-7 heavy tank, which was not accepted for series production. **(D, E)** The gun mantlet on the early T-10 is distinctive, with the 12.7mm DShKM mounted in situ. The periscope sight aperture on the left side of the turret is found

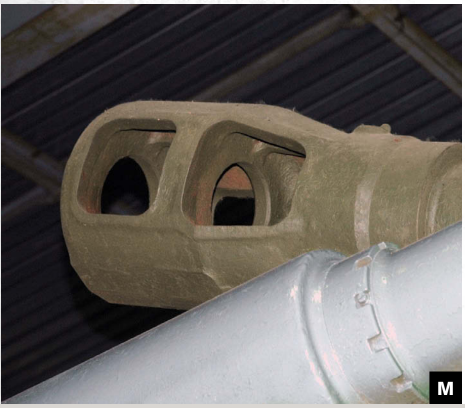


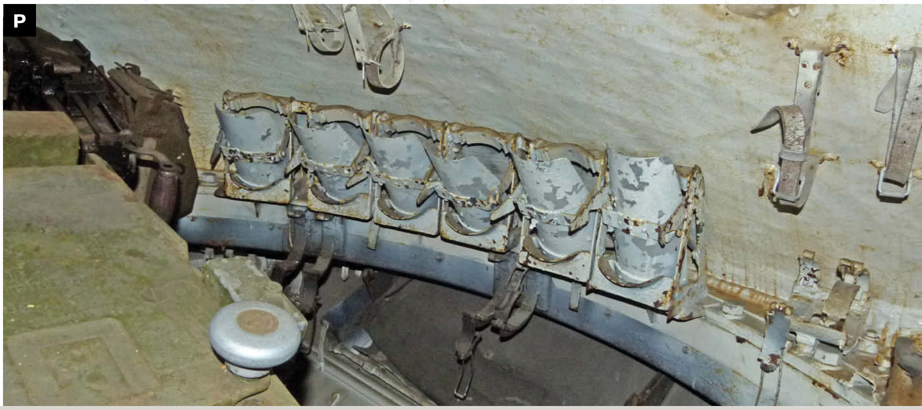




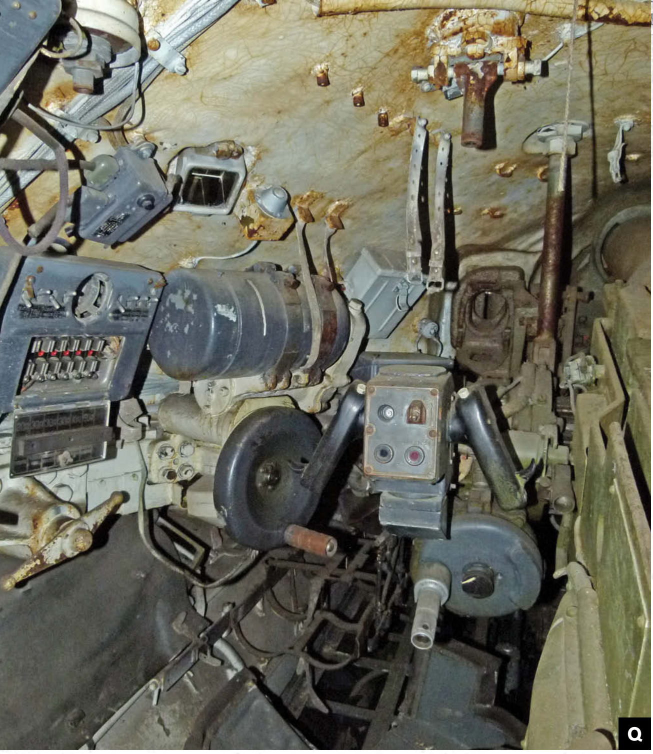


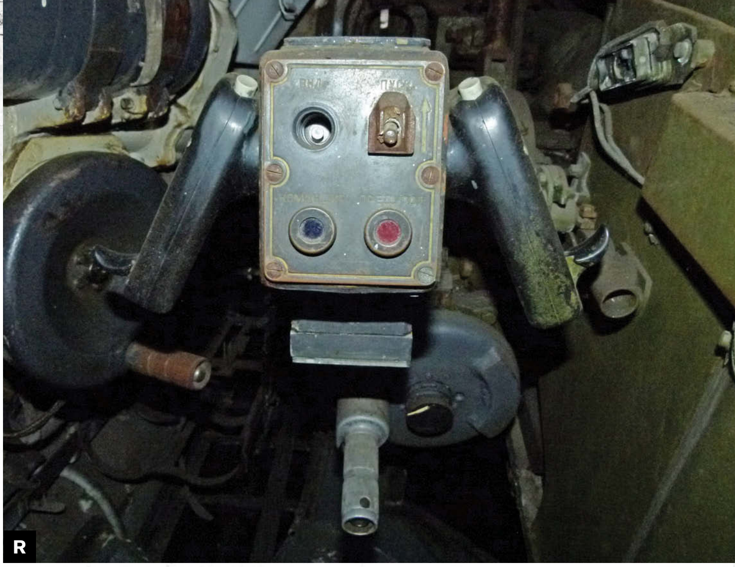


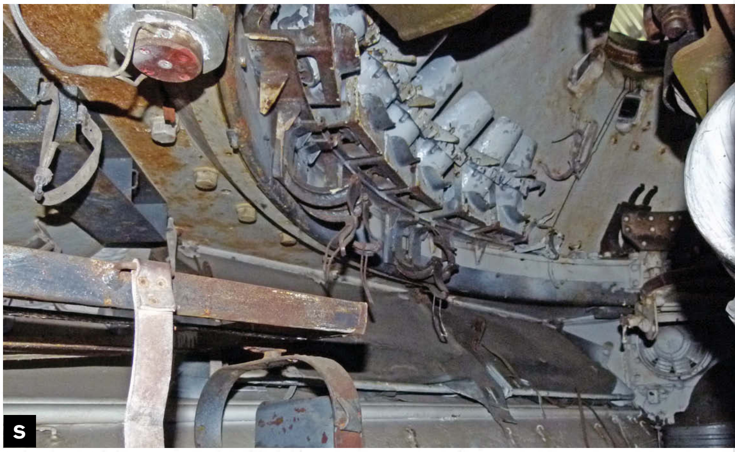


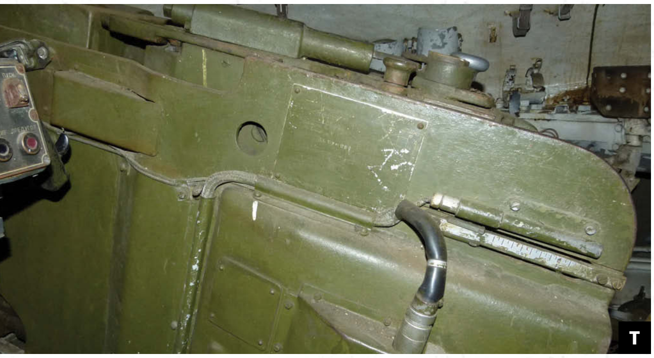


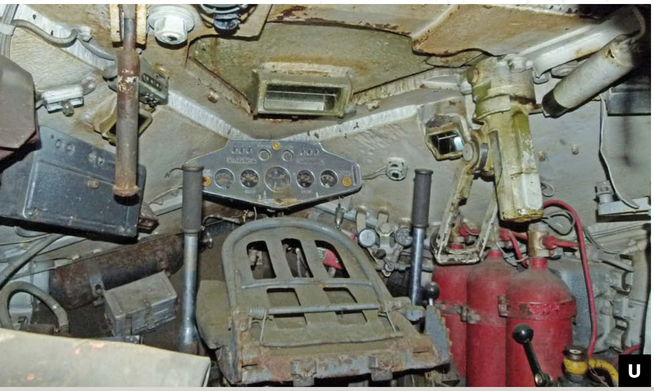
on early production T-10 tank models, but is also found on tanks as late as the T-10B, and even Russian sources are conflated on the use of gun mantle. **(F)** Features on the early T-10 include the thin sheet metal rain guards around the frontal arc of the lower turret. **(G, H, I, J, K)** The gun breach of the 122mm D-25T tank gun is large but compared to the IS-3 there is significantly more room in the T-10 turret. Note the ammunition projectile racks on the turret wall. **(L)** The driver-mechanic's hatch on the T-10 is far more convenient than on the IS-3, but is still directly under the gun mantlet on the tank centreline. **(M)** The conventional double baffle muzzle brake used on the T-10, T-10A and T-10B. **(N)** The T-10 tank at Kubinka is located together with an example of the later T-10M, the Obiekt-268 self-propelled gun prototype and several potential T-10 replacement prototypes. **(O)** The 12.7mm DShKT co-axial machine gun is a tight fit alongside the main armament. **(P)** Ammunition projectile ready-racks mounted on the turret side.

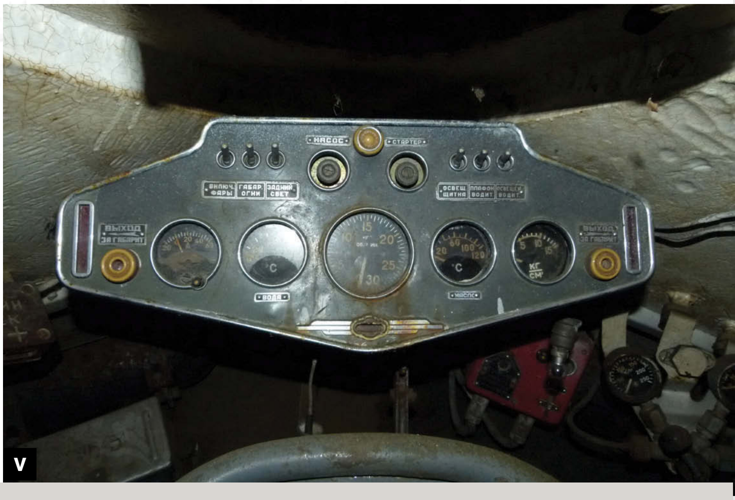






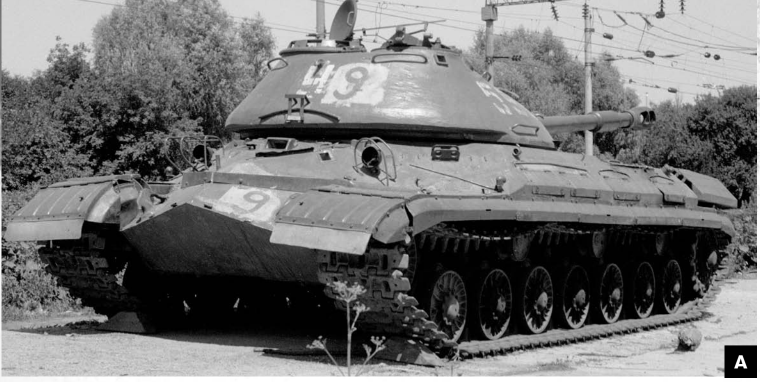






(CONTINUED) T-10 (T-10A) KUBINKA TANK MUSEUM

(Q, R) The early T-10 D-25T tank gun was not stabilized. The 122mm D-25TS, introduced on the T-10A, featured PUOT-1 vertical axis gun stabilization and fire control, with the PUOT-2 installed on the T-10B providing twin-axis gun stabilization. **(S)** From floor level, the chamfered hull shape is evident below the turret race, more obvious than when viewed from the outside. **(T)** The 122mm D-25 T series tank gun breech. **(U)** The driver-mechanic's position with hydraulically assisted hatch lift mechanism and PPO fire extinguishing system. **(V)** The driver-mechanic's panel on this tank includes interesting warning lights indicating that the tank is oversize for a given location.



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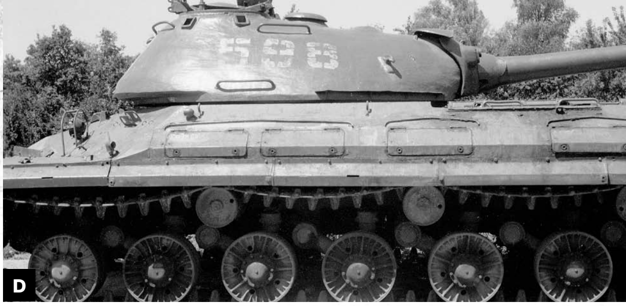

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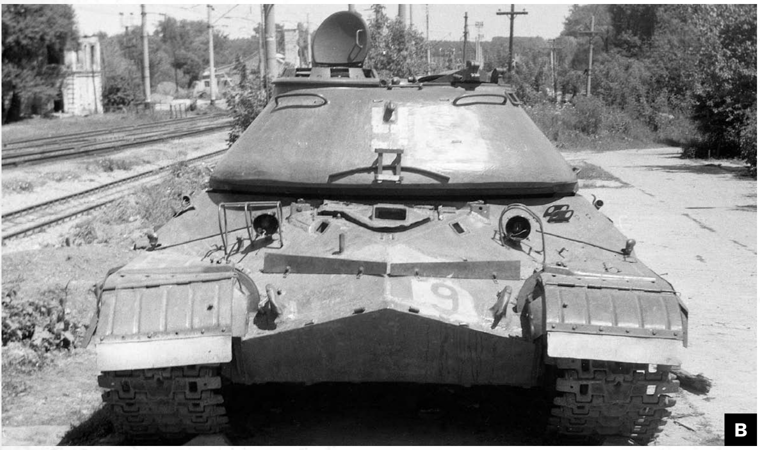

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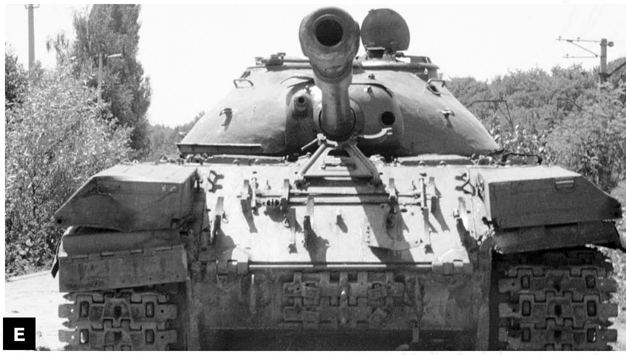

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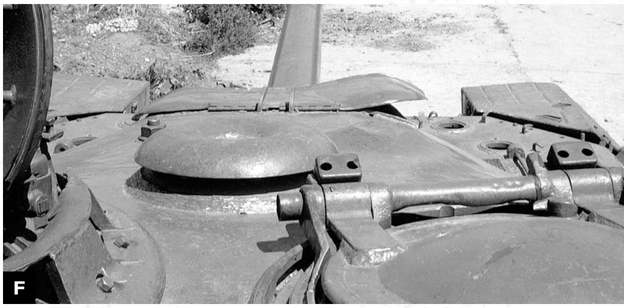

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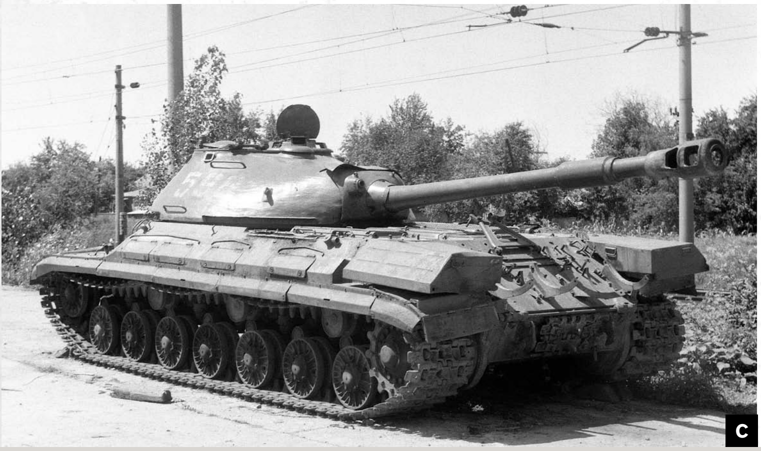

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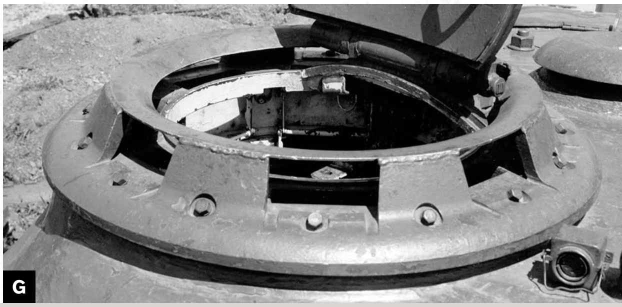

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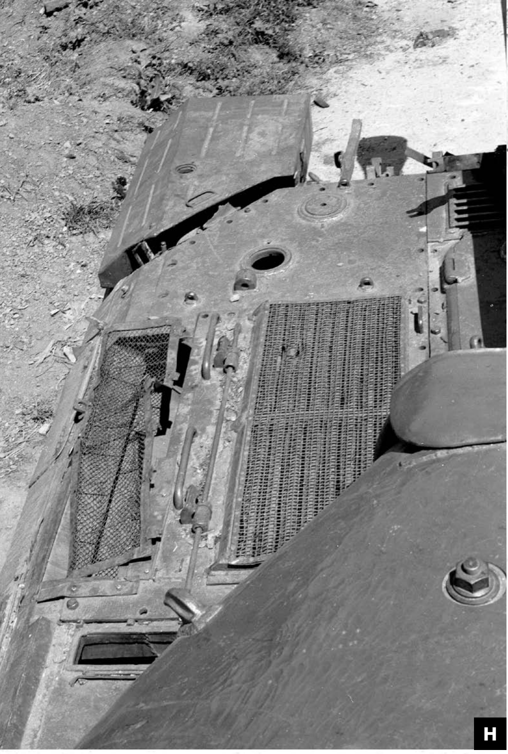
T-10 (T-10B) BUCHA RAILWAY STATION, UKRAINE

(A) This T-10 (T-10B) was photographed at Bucha Railway Station in Ukraine while en route to being converted to 'metallolom' (scrap) in 1989. The number of early T-10, T-10A and T-10B tanks in Ukraine that remained in their original configuration without significant armament or fire control upgrades until removed from service is noteworthy. The tank is again an early production T-10 with some upgrades such as the bore evacuator but no TPS-1 sight installation as normally fitted on the T-10A and T-10B. As is clear, accurately defining the T-10A and T-10B, of which few were built in total, is far from an exact science due to the various partial upgrades involved. **(B)** This tank has been upgraded with a bore evacuator and IR driving lights, long since pilfered from this tank awaiting its ultimate fate. Compare the commander's cupola on this tank with other T-10A and T-10B tanks; there are significant and not necessarily chronological differences between tanks. **(C)** The T-10 series was in profile superficially similar to the IS-3/IS-3M, but was longer, larger and with an entirely different turret. In service it was fitted with sheet steel track guards as fitted to the IS-3M. Note the plain disc return rollers. **(D)** The T-10 (T-10B) photographed at Bucha Railway Station prior to its ultimate destruction has been upgraded in service, with some 'T-10B' level upgrades but without the GPS-1 gyroscopic sight that defined the T-10A and later T-10B. **(E)** This T-10, nominally a T-10B as described by the unit in which it served, has some T-10A/B upgrades but no TPS-1 gyroscopic sight on the left side of the turret roof, and presumably no gun stabilization. The rear fuel tanks on all T-10s would appear to have frequently suffered minor damage from manoeuvring accidents. **(F)** A nice view over the turret roof, showing the 'mushroom' dome ventilator that was a recognition feature of early T-10 series tanks. **(G)** The commander's cupola, with all the vision blocks removed. Note the rear-facing convoy light.



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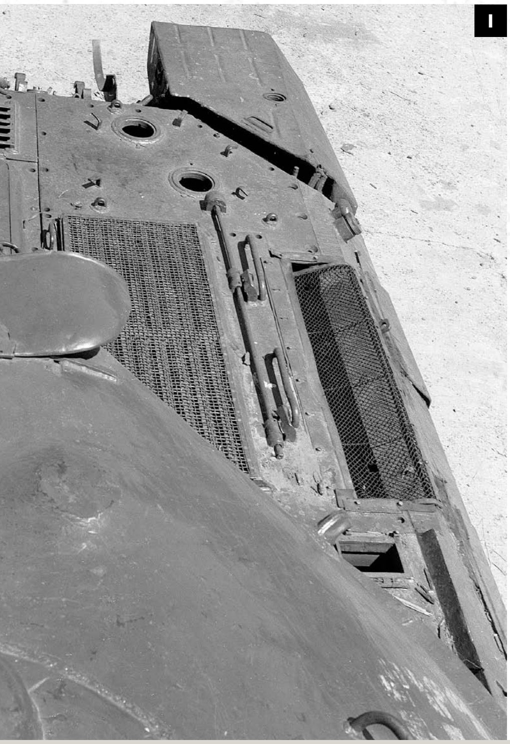

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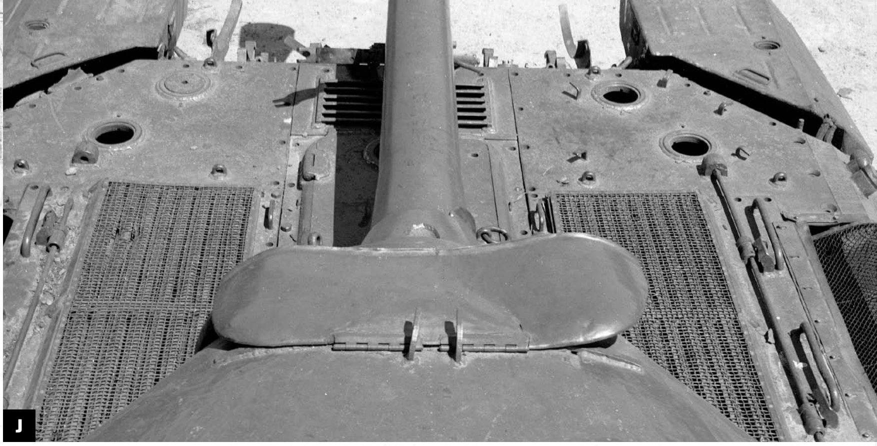

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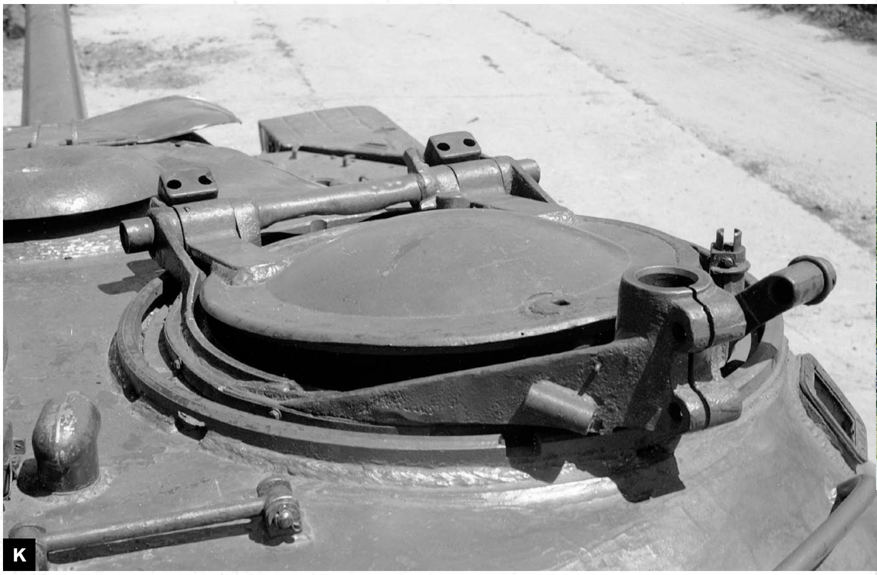

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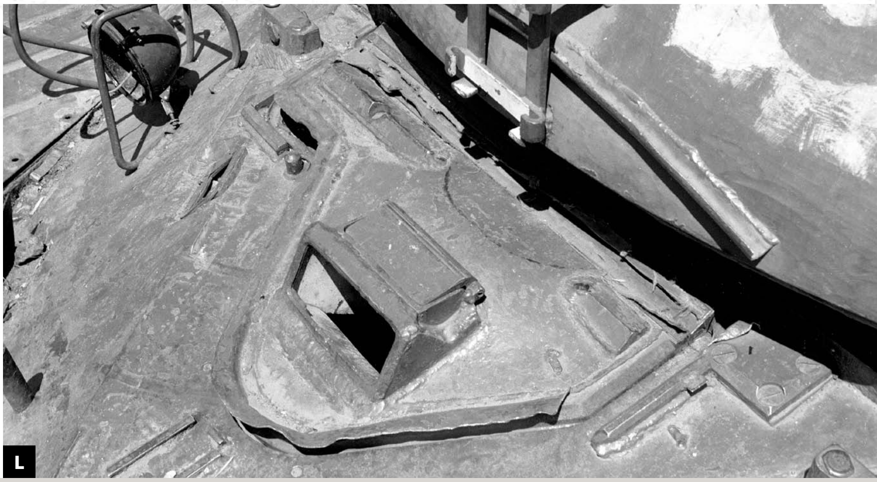

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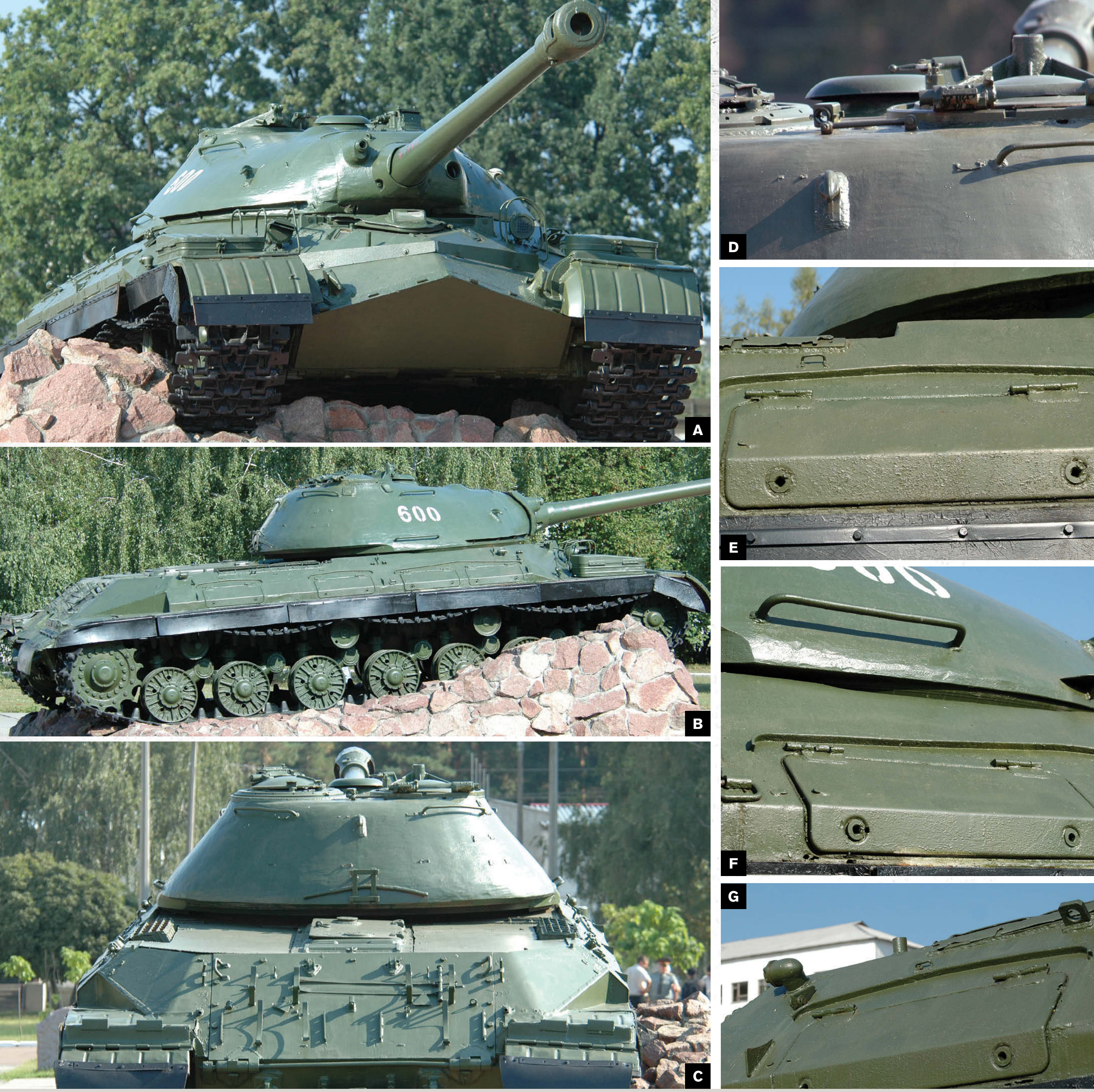
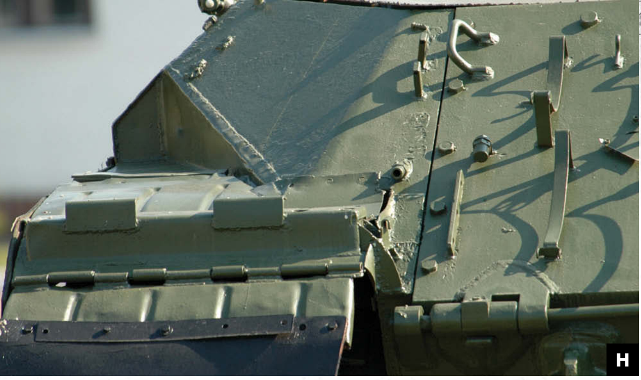
(CONTINUED) T-10 (T-10B) BUCHA RAILWAY STATION, UKRAINE

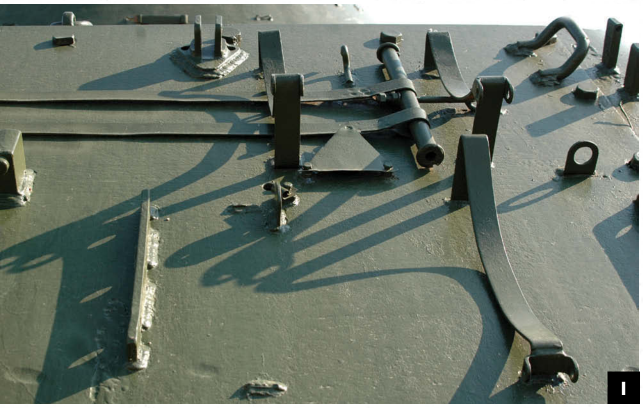
(H, I, J) These views over the rear engine deck show the correct engine deck arrangement for pre-T-10M production T-10 tanks, though it does not match the original plant drawings. **(K)** The loader's hatch with 12.7mm DShKM AAMG machine gun mounting. **(L)** With the turret traversed to the rear, the driver-mechanic's hatch is clearly visible.

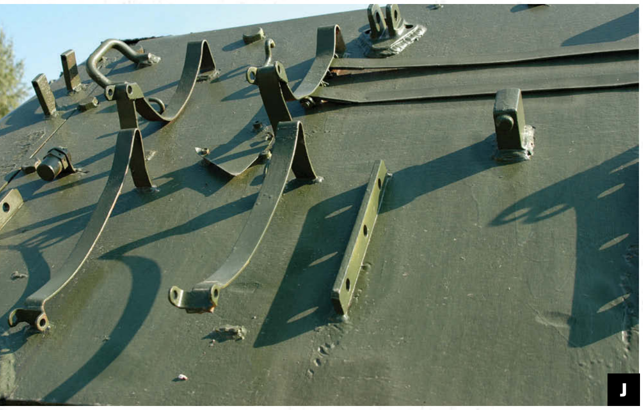


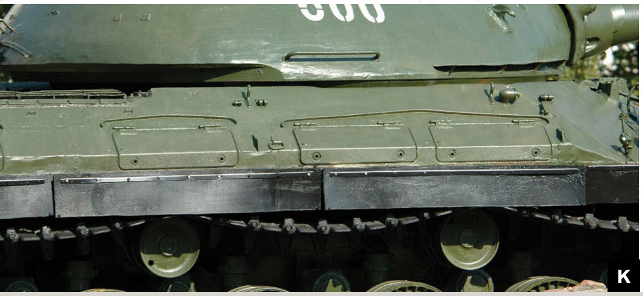
T-10 (T-10B) 1ST INDEPENDENT TANK BRIGADE, UKRAINE

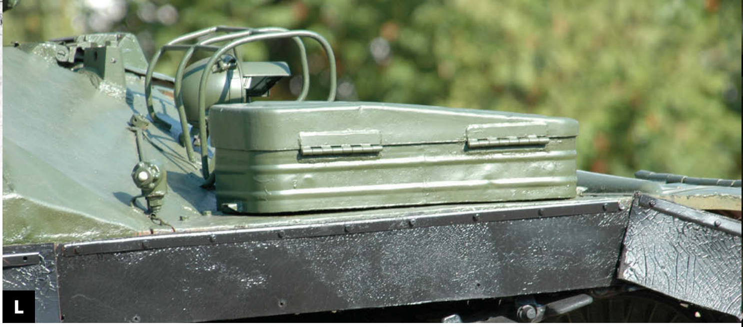
(A) The T-10 (T-10B), located today as a memorial within the territory of the 1st Independent Tank Brigade, was based in strategic long-term storage in Ukraine. As with the majority of tanks that were declared surplus to requirement as a result of the Conventional Forces Europe (CFE) treaty, the majority of T-10 tanks in Ukraine were broken up for scrap in the final years of the Soviet Union. A few survived as monuments at military garrisons, such as this example, or as war memorials. **(B)** This T-10 (T-10B) was released from strategic reserve storage with the 1st Independent Tank Brigade, Ukraine, in 1997. Whereas many such T-10 tanks were broken up and melted down for scrap, the Ukrainian Army placed this tank on a monument as a permanent memorial. It is an early production T-10 but has been upgraded in service, though the TPS-1 gyroscopic periscope sight and bore evacuator are missing from what is described as a T-10B. The engine has been removed and the engine deck plated over. **(C)** The T-10 turret is less heavily sloped than that of the IS-3, and significantly larger, so that the turret crew are far better accommodated than in the tank's predecessor. **(D)** Early T-10 tanks featured a distinctive 'mushroom' turret ventilator mounted on the turret roof. **(E, F, G)** The stowage compartments on the T-10 are provided with individual rain gutters.

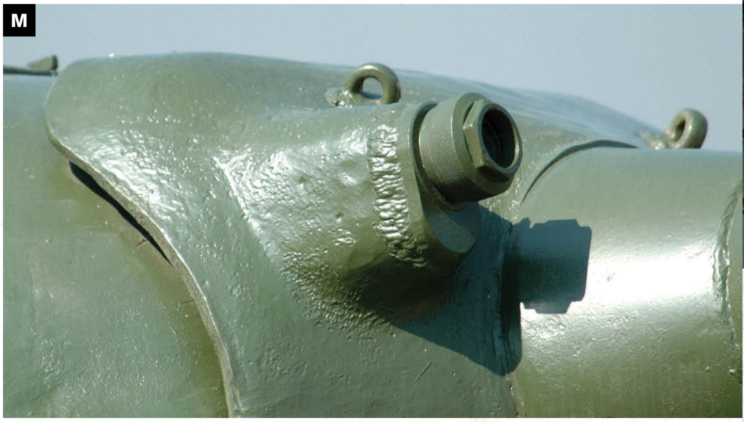


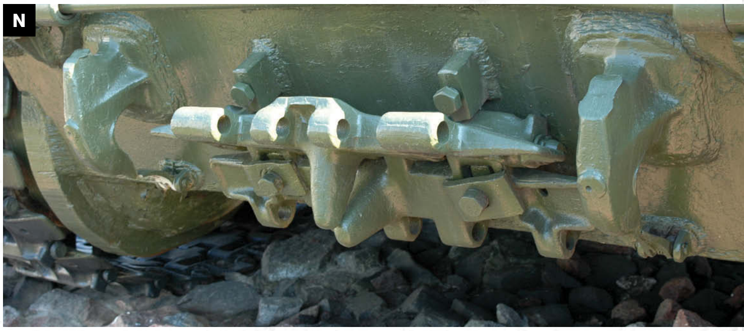


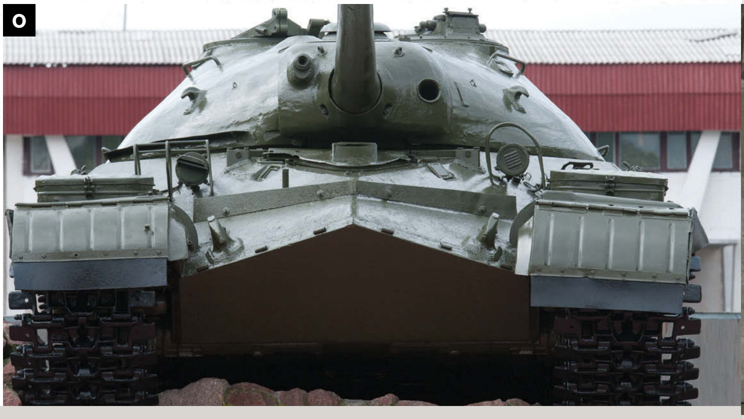






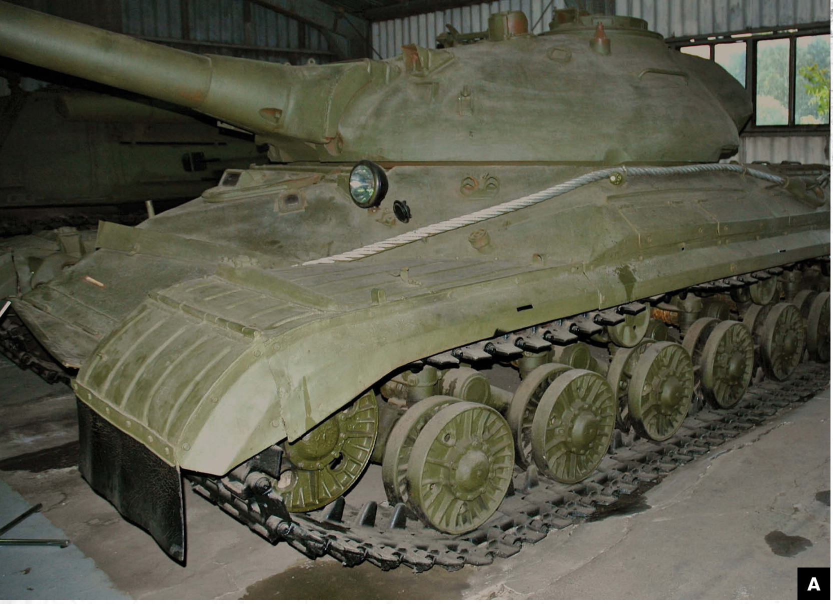






(CONTINUED) T-10 (T-10B) 1ST INDEPENDENT TANK BRIGADE, UKRAINE

(H) The T-10 hull rear is distinctly chamfered, with contoured flat fuel tanks mounted at the rear of the T-10 in service. **(I)** **(I, J)** The rear armour plate has mountings for both BDSh-5 smoke containers and additional fuel tanks. **(K, L)** This T-10 has non-standard rubber skirts in place of the standard steel dust guards, which may have been added for display purposes. The ZIP spares box was purpose made for the T-10 series. **(M)** The 12.7mm DShKM (T) co-axial machine gun mantlet is a key recognition feature of the early T-10, T-10A and T-10B production models. **(N)** Spare track links mounted on the hull rear lower armour plate. **(O)** With the splash deflector removed, the T-10 glacis more resembles that of its IS-3 predecessor; however, the overall glacis shape is very different.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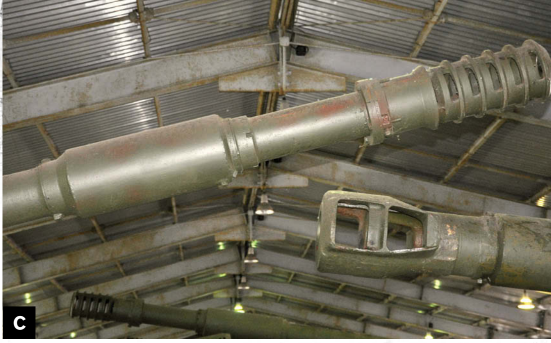
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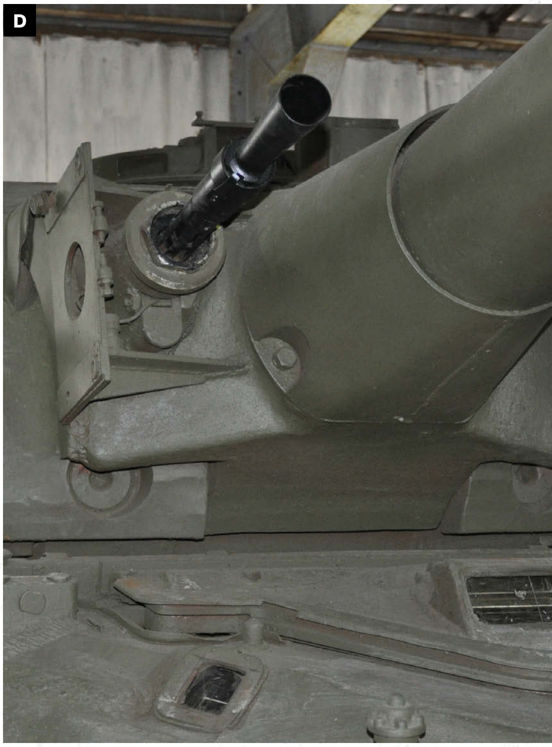
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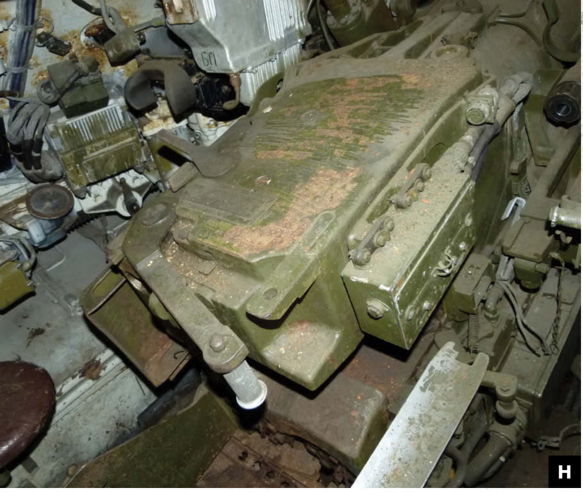
T-10M KUBINKA TANK MUSEUM

(A) The T-10M today located at the Kubinka Tank Museum is in full running order. As with the early production T-10 also located at the museum, it is a prototype development tank rather than a standard production model. As such, great care should be taken to cross-reference museum exhibits with the tanks in service as shown elsewhere in this book, or recently retired from service. **(B)** The right side of the T-10M turret is devoid of apertures, with the gun sighting on the left side of the turret. **(C)** The T-10M's most distinctive feature is the multi-baffle muzzle brake and bore evacuator. **(D)** The 14.5mm KPVT co-axial machine gun mounting takes up considerable space in the T-10M gun mantlet. **(E)** The vertical bracket is for attaching the L2 infrared night vision searchlight. **(F)** The gun mantlet on the T-10M was covered by a canvas cover when in service. **(G)** The commander's hatch in open position.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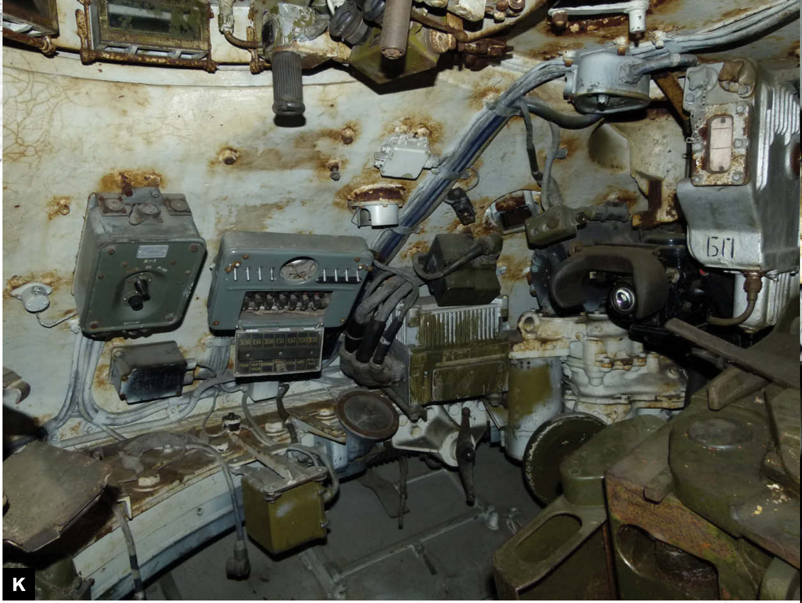
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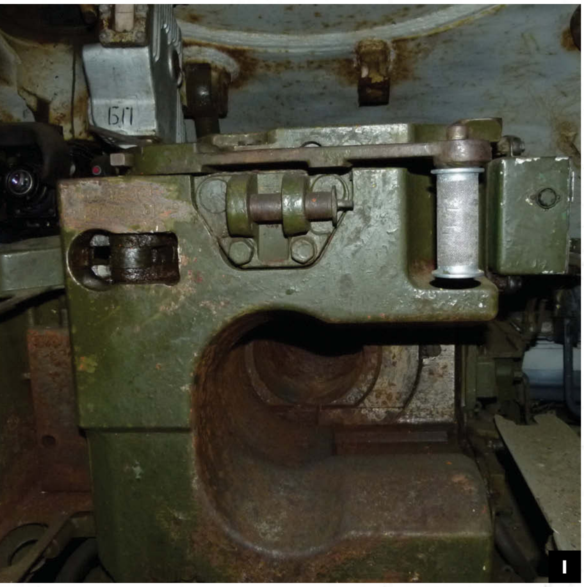
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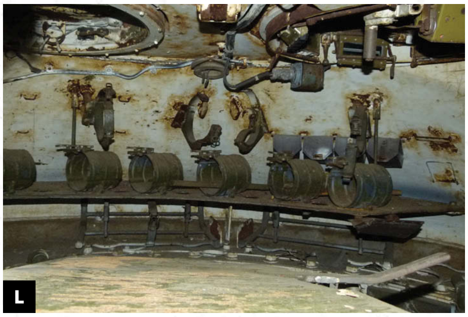
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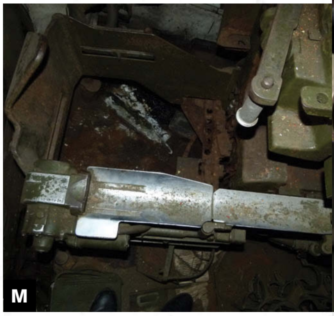
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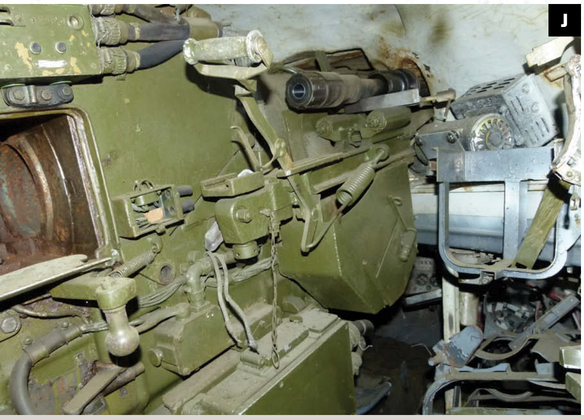
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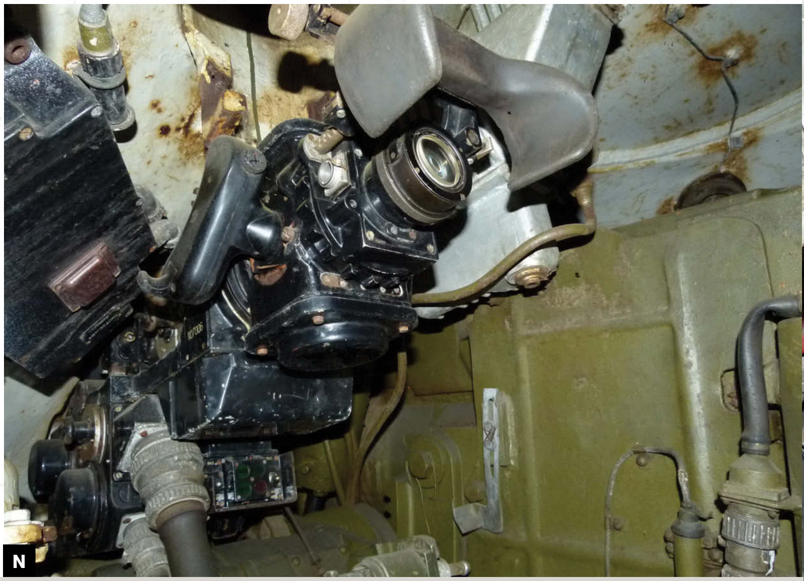
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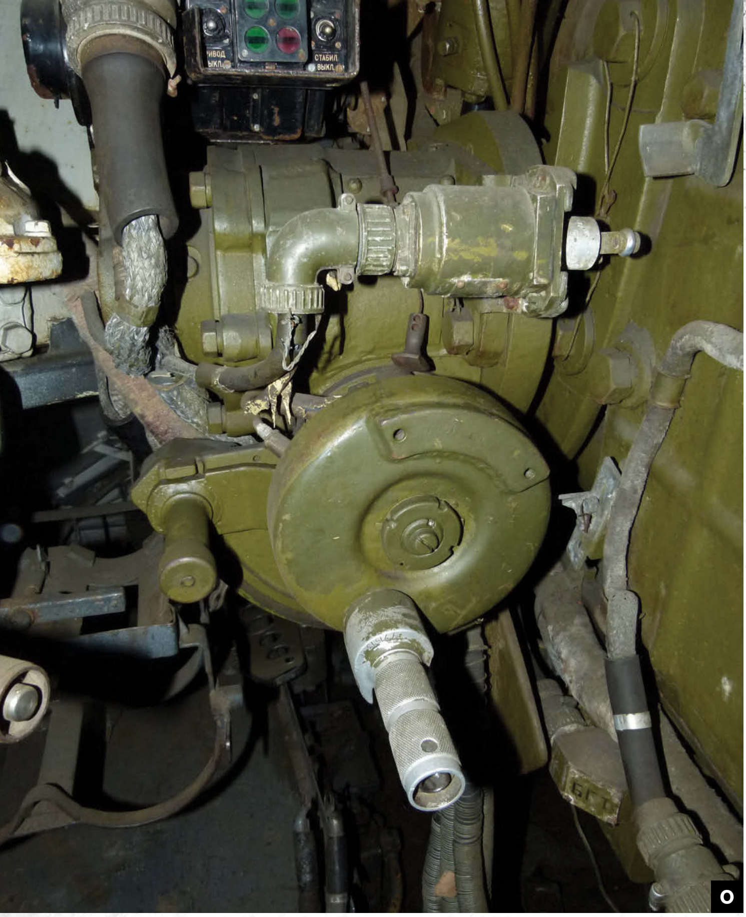
(CONTINUED) T-10M KUBINKA TANK MUSEUM

(H) The 122mm M-62-T2 tank gun breech, with gunner's position to the left. **(I)** Gun loading was mechanically assisted, but not automated. **(J)** The 14.5mm KPVT machine gun has been removed, leaving only the barrel in place. **(K)** The gunner's and commander's positions to the left of the main armament. **(L)** The turret rear with the commander's and loader's hatches and projectile racks. **(M)** The mechanized loading chute greatly aided the loader, who now had 'only' to drop the round onto the chute rather than manually manoeuvre the rounds into the gun breech. **(N)** The T-10M inherited its dual-axis PUOT-2 gun stabilization from the T-10B, modified as the PUOT-2S, integrated with the main gun sight. **(O)** The gun stabilization system control (in the background) could be turned off and all adjustments made manually. **(P)** The driver-mechanic's position with natty 'GTi'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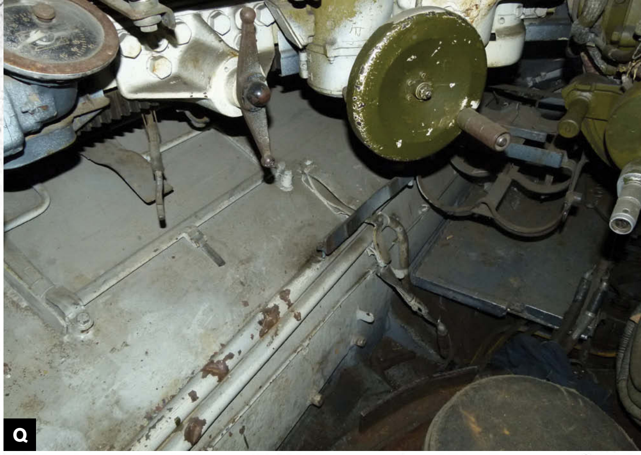
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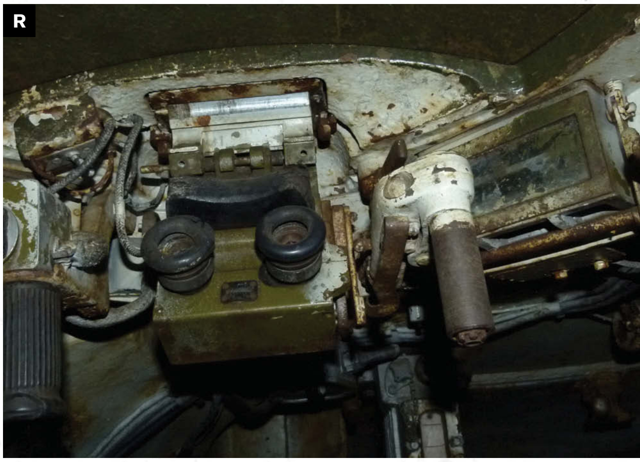
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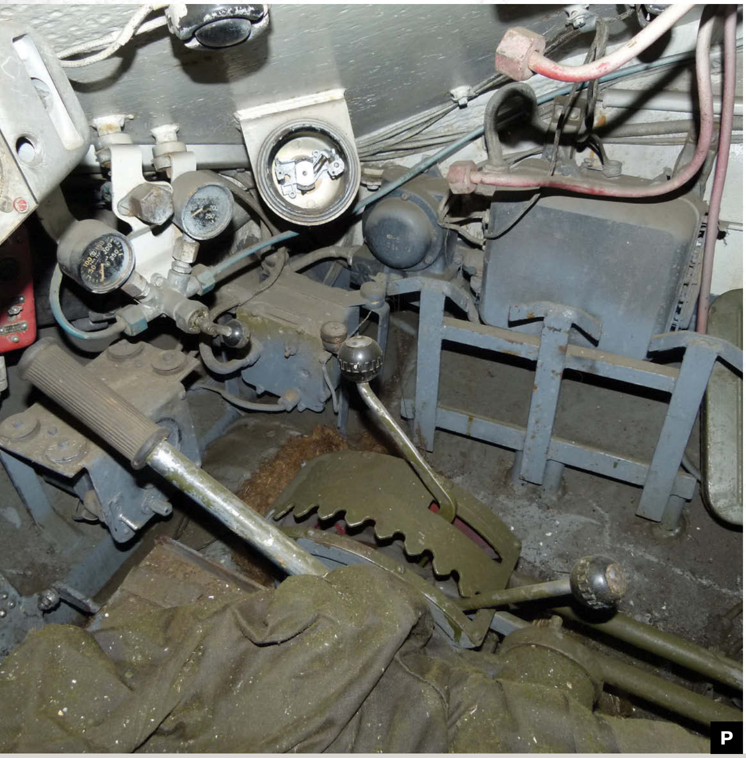
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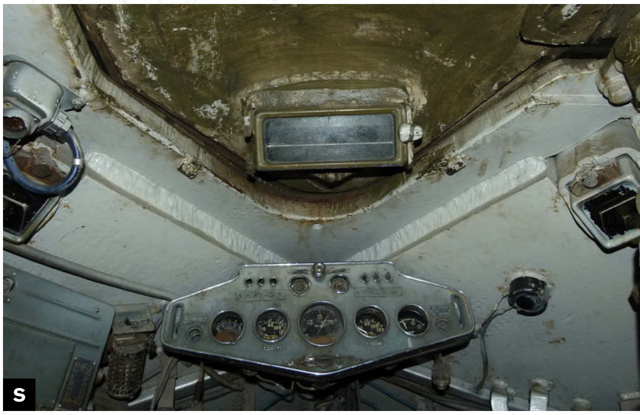
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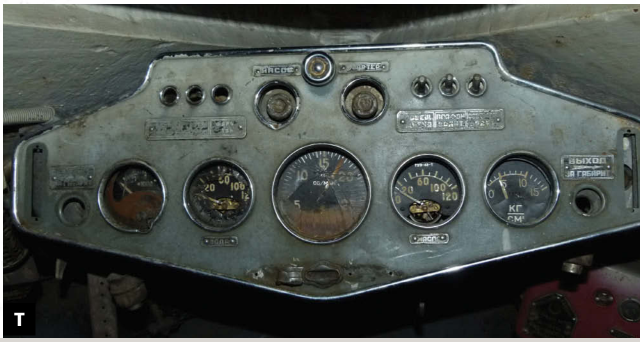
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style gear selector knobs. **(Q)** The gunner's seat, traverse and elevation controls. Note the chamfered shape of the hull side. **(R)** The commander's TPKU periscope sight. **(S)** The inside of the driver-mechanic's hatch is painted in green, presumably so as not to show glinting white paint in the event the hatch is open in field conditions. **(T)** The T-10M driver-mechanic's main control panel.

APPENDICES

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APPENDIX ONE
T-10 DEVELOPMENT, PRODUCTION AND SERVICE CHRONOLOGY

1944	ChKZ design project initiated on the future IS-5 heavy tank – design project status only.
05.02.44	ChKZ to work on Obiekt-705 and LKZ to work on Obiekt-257 for a new super heavy tank.
08.06.44	ChKZ ordered to work on the IS-6 tank design.
29.03.45	IS-3 heavy tank accepted for service with the Red Army.
10.45	LKZ works on Obiekt-257, 258, 259, 260 and 261 heavy tank designs, of which Obiekt-260 will be the prototype IS-7.
06.02.46	ChKZ ordered to prepare for production of the IS-4.
21.02.46	LKZ and Prototype Plant No. 100 begin work on new Obiekt-260 heavy tank design.
02.04.46	ChKZ ordered to work on a variant of Obiekt-705, Obiekt-705A.
29.04.46	IS-4 accepted for service with the Soviet Army.
05.08.46	ChKZ ordered to improve the IS-4 heavy tank.
27.09.46	Ejection cooling system is trialled on Obiekt-242 (an ISU-152 fitted with the new cooling system).
09.04.47	IS-4 heavy tank taken out of production with only 200 built; all to be rebuilt as IS-4M heavy tanks.
11.06.48	Prototype Plant No. 100 re-organized as VNII-100.
22.07.48	Obiekt-705 description changed and ChKZ ordered to work on the new version.
18.02.49	Work on the IS-7 terminated.
19.02.49	ChKZ ordered to work on a new heavy tank design with VNII-100 – Obiekt-730.
22.03.49	Production of the IS-4M ordered terminated.
11.04.49	Project for Obiekt-705A now designated Obiekt-730 or IS-5 heavy tank.
15.05.49	IS-5 heavy tank project approved.
10.06.49	LKZ ordered to correct the defects in the IS-3 heavy tank.
15.10.49	ChKZ to have first prototype Obiekt-730 ready by 25 November 1949; all work on Obiekt-705 terminated.
31.07.51	1LKZ ordered to create joint heavy tank design bureau with VNII-100.
12.09.51	1LKZ directed to consider heavier armament for the IS-5 tank; work is ongoing on Article 265 (Obiekt-730 with the M-62T gun) and Obiekt-267 with PUOT sight system.
29.03.52	T-10 ordered to be fitted with gun stabilizer systems.
09.04.52	All IS-4M heavy tanks transferred to strategic reserves.
19.12.52	Modified 122mm and alternative 130mm armament for the IS-5 to be tested on Obiekt-265.
29.02.53	IS-5 re-designated IS-8 due to the massive number of improvements made to the prototype Obiekt-730 tanks.
28.11.53	IS-8 is accepted for accepted for service with the Red Army but re-designated T-10 heavy tank.
15.12.53	T-10 ordered into production.
1954	IS-2M post-war upgrade accepted for service with the Soviet Army.
28.05.54	IS-3 tested with D-25TEh gun: first effort at developing a bore evacuator.
14.12.54	Recommendations made to improve the T-10 tank.
28.05.55	LKZ authorized to work on Obiekt-278 heavy tank with turbine engine.
06.55	T-10 now given a new fuel tank with 270 more litres of fuel (930 total).
24.02.55	LZK ordered to test three Obiekt-267sp1 tanks and begin work on the Obiekt-267sp2 tank with twin-axis gun stabilizer.
12.08.55	LKZ ordered to work on a new generation of heavy tanks.
12.08.55	ChTZ ordered to develop a new engine for the T-10 – Obiekt-770.
01.55	LKZ ordered to develop Obiekt-272 – T-10M.
17.05.56	Obiekt-267sp1 accepted for service with the Soviet Army as the T-10A. Produced at ChKZ as their Obiekt-731.
11.02.57	Article 267sp2 accepted for service with the Soviet Army as the T-10B. Produced at ChKZ as their Obiekt-733.
08.05.57	ChTZ ordered to develop a heavy missile tank destroyer – Obiekt-775.
08.05.57	LKZ ordered to develop a heavy missile tank destroyer – Obiekt-282.
11.07.57	LKZ given the TTT for a heavy missile tank destroyer – Obiekt-282.
26.09.57	T-10M accepted for service with the Soviet Army. Produced at ChKZ and LKZ.
15.05.58	ChKZ renamed as Chelyabinsk Tractor Factory – ChTZ.
18.12.58	LKZ given the TTT for a heavy tank destroyer firing unguided rockets
1959	T-10MK command tank enters production.

01.06.59	Work begins on partially combustible propellant cases for 122mm tank guns.
04.07.59	LKZ ordered to terminate work on Obiekt-282; given the TTT for a new heavy missile armed tank destroyer – Obiekt-286.
29.08.59	LKZ given specific and updated TTT for Obiekt-286.
30.05.60	Work on Obiekt-775 terminated.
19.07.60	All work on heavy tanks with gun armament to be terminated.
17.02.61	Work on all heavy tank programmes (T-10, Obiekt-277, Obiekt-279, Obiekt-770 ordered to be terminated by the Council of Ministers.
10.10.62	LKZ ordered to cease production of heavy tanks as of January 1963; however, they continue with prototype designs even though officially ordered to terminate them.
1964	ChTZ ordered to cease production of the T-10M.
1965	T-10 series removed from production.
20.08.68	T-10M equipped 95th TTP, 9th TD 1st GTA, participates in the Czech invasion under Operation *Dunay* (Danube).
26.12.91	Soviet Union dissolved and becomes the Russian Federation and Commonwealth of Independent States (CIS).
1993	T-10 series removed from service with the Russian Army.
23.09.97	T-10, T-10A, T-10B and T-10M tanks series officially removed from service by presidential decree and ordered to be scrapped.

APPENDIX TWO

T-10 PRODUCTION DATA TABLES

T-10 PRODUCTION NUMBERS

Year	**T-10**	**T-10A**	**T-10B**	**T-10M**	**T-10MK**
1950	13*	-	-	-	-
1951	2*	-	-	-	-
1952	-	-	-	-	-
1953	10	-	-	-	-
1954	30	-	-	-	-
1955	90	-	-	-	-
1956	70	30	-	-	-
1957	-	20	110	-	-
1958	-	-	-	174	-
1959	-	-	-	150	35
1960	-	-	-	163	35
1961	-	-	-	192	10
1962	-	-	-	160	10
1963	-	-	-	100	-
1964	-	-	-	80	10
1965	-	-	-	60	-
Total	200	50	110	1079	100
Total production of all T-10 variants 1953–65 – 1,539 plus *prototypes which were not counted as part of the overall production totals.					

T-10 PRODUCTION BY PLANT

	T-10	T-10A	T-10B	T-10M	T-10M	T-10M	T-10MK	T-10MK	Totals
Plant	ChKZ	ChKZ	ChKZ	ChKZ	LKZ	ChKZ	LKZ	ChKZ	
Obiekt No.	Ob.730	Ob.731	Ob.733	Ob.734	Ob.272	Ob.272	Ob.272K	Ob.272K	
1950	13*	-	-	-	-	-	-	-	13*
1951	2*	-	-	-	-	-	-	-	2*
1952	-	-	-	-	-	-	-	-	-
1953	10	-	-	-	-	-	-	-	10
1954	30	-	-	-	-	-	-	-	30
1955	90	-	-	-	-	-	-	-	90
1956	70	30		-	-	-	-	-	100
1957	-	20	110	-		-	-	-	130
1958	-	-	-	100	74	-	-	-	174
1959	-	-	-	120	30	113	35	-	298
1960	-	-	-	-	50	102	35	-	187
1961	-	-	-	-	90	100	10	-	200
1962	-	-	-	-	60	100	10	-	170
1963	-	-	-	-	-	80	-	10	90
1964	-	-	-	-	-	60	-	-	60
1965	-	-	-	-	-	-	-	-	-
Total	200	50	110	220	304	555	90	10	1539 (1564*)

* Prototypes which do not seem to fall under any of the production totals: these would provide a total production number of 1,564 if not intermingled with other production models at a later date.

T-10 RELATED SERIAL NUMBERS

After World War II, the Soviet Union modified the serial number format used for its tanks to a new simpler arrangement. It consisted of the two-digit year of production and month, a letter to indicate the responsible manufacturing plant, and a number for the vehicle or item produced in that month, starting 001 (or total, varied by plant). Plant A was the Chelyabinsk Kirov Plant (ChKZ, ChTZ); Plant B was the Leningrad Kirov Plant (LKZ).

As related to the T-10 tank, some known serial numbers are as follows:

Serial Number	Vehicle Type
5002A102	Obiekt-730 (Prototype IS-5)
5002A103	Obiekt-730 (Prototype IS-5)
5002A104	Obiekt-730 (Prototype IS-5)
5006A311	Obiekt-730 (Prototype IS-5 – Establishment Lot)
5006A312	Obiekt-730 (Prototype IS-5 – Establishment Lot)
5006A316	Obiekt-730 (Prototype IS-5 – Establishment Lot)
5006A320	Obiekt-730 (Prototype IS-5 – Establishment Lot) used for running testing
5310A321	Obiekt-730 – Production Model T-10
5409A311	Obiekt-267sp1 (Prototype T-10A)
5409A313	Obiekt-267sp1 (Prototype T-10A)

5505A002	Obiekt-734A (Prototype T-10M) fitted with IR system
5505A003	Obiekt-734A (Prototype T-10M) fitted with IR system
5702A539	Obiekt-733 (Prototype T-10B)
5804B01	Obiekt-272 – Production Model T-10M
5804B03	Obiekt-272 – Production Model T-10M
5808N001	Obiekt-770 – Prototype
5808N002	Obiekt-770 – Prototype

APPENDIX THREE

SOVIET ERA TANK DESIGN AND PRODUCTION FLOW

1 All new Soviet armoured vehicle projects began with a requirement from the Soviet Council of Ministers (SM SSSR) and the Soviet Central Committee (TsK). These were given to the relevant plant(s), which considered whether they could meet the project requirements. If the plant could carry out the required task, it was tasked with undertaking scientific research work on a given project to determine its viability.

2 **Scientific Design Work** (*Nauchno-Issledivatalnaya Rabota* or NIR). This was the scientific work that determined the feasibility of a project and provided possible technical solutions. At this stage the project either had a project name (e.g. 'Liven', 'Oka', 'Akatsiya', etc.) or a plant internal designator. Once the NIR work was approved by the Scientific Committee (NTK) on behalf of the Soviet Council of Ministers, the plant was then authorized to carry out prototype design work.

3 **Prototype Design Work** (*Opytno-Konstruktorskaya Rabota* or OKR). At this stage, the project was now given an article 'Izdeliye' or object 'Obiekt' designator number (e.g. Obiekt-730, Obiekt-272). This stage required the development of at least one running prototype for assessment. Depending upon the task at hand, as many as six prototypes could be built, including one for the destructive testing of a hull and turret armour set.

4 **Plant Testing**. Once the prototype was ready, it underwent plant testing by the designers and engineers in concert with the 'customer' representative – the Ministry of Defence (MO) representative to the plant. Once any significant engineering deficiencies had been ironed out and

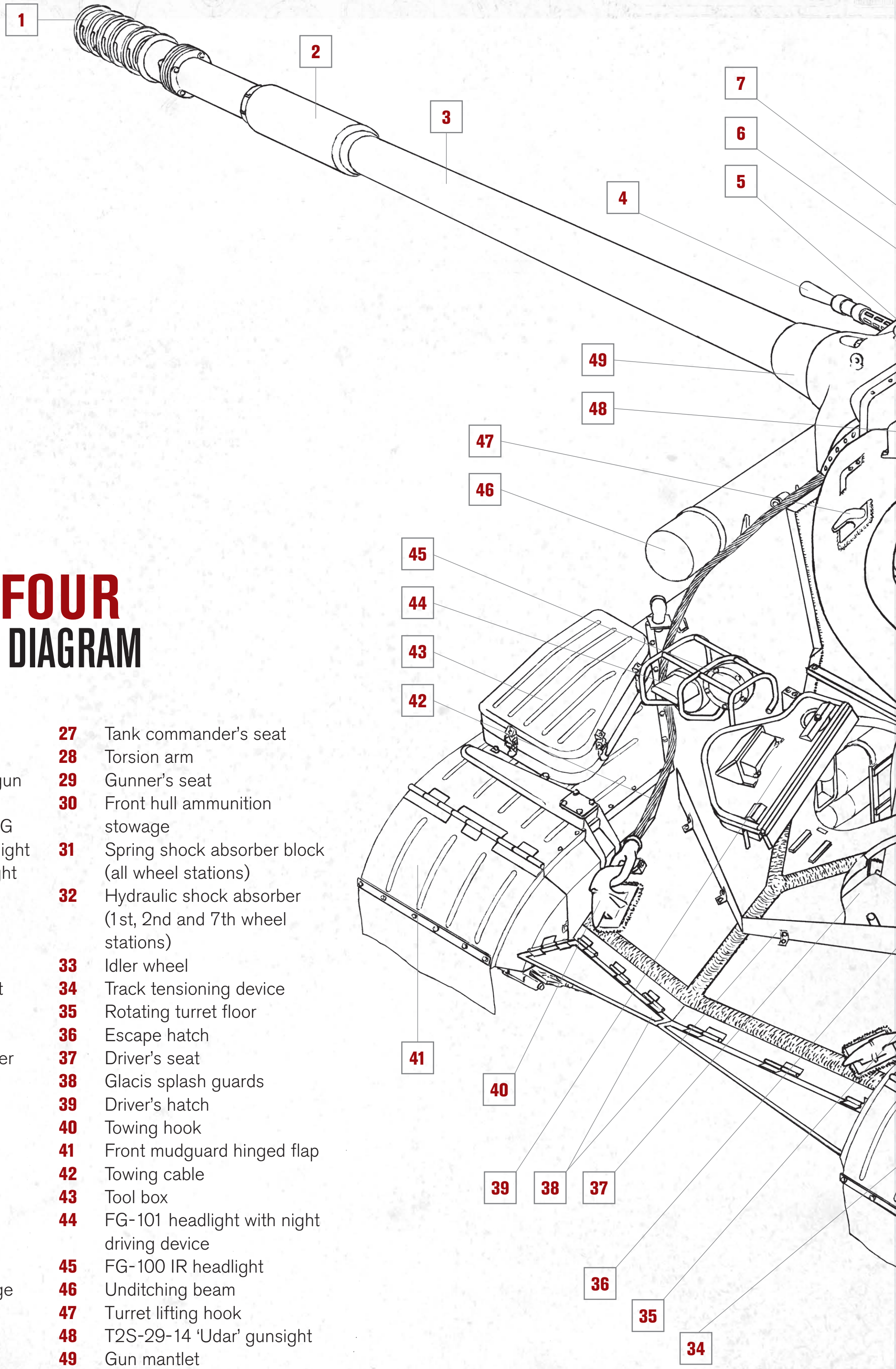
approval granted by the Scientific Committee, the vehicle was then sent for State Polygon Testing, usually at the polygon (range) attached to the NIIBT institute at Kubinka, 60km west of Moscow.

5 **State Polygon Testing**. The military and representatives of the Ministry of Defence and Ministry of Defence Production tested all major parameters of the new vehicle in a series of planned tests at the Kubinka polygon. A report with conclusions and recommendations was made, by which the manufacturing plant was required to undertake repairs or corrections as advised. Once all such modifications were complete, permission was granted for operational testing with the Soviet Army.

6 **Operational Testing**. This usually required the production of an establishment lot (*ustavlennaya partiya*) of vehicles to be built by the plant – which might be a batch of three, five, ten or 25, depending on the viability of the design and requirements for thorough testing. Vehicles were often sent to various parts of the Soviet Union for testing – the north and arctic for winter conditions, Kazakhstan and Soviet Turkestan for desert conditions, the Urals for mountainous conditions, etc. Once the vehicle passed its operational testing phase, the Ministry of Defence and appropriate Production Ministry would recommend the vehicle for acceptance and full series production.

7 **State Resolution**. A joint resolution of the Central Committee of the Communist Party (TsK) and the Council of Ministers of the USSR (SM SSSR) (many members holding positions in both) then gave the vehicle a service designation (i.e. T-10, T-10A, T-10M, etc.) and announced its acceptance for service with the Soviet Army. Full production was then usually ordered by the Soviet Ministry of Defence and the appropriate Production Ministry (though occasionally a project was cancelled at this point due to extenuating circumstances). The plant (or plants) then prepared to put the vehicle into full production. This could take place nearly immediately if the project was a minor modification of a vehicle that was already in series production, or take as much as 18 months to execute if the plant was required to re-tool to produce the new vehicle.

The overall 'concept time' from initial project review to first series production of a new design could be up to ten years, depending on the complexity of the design.

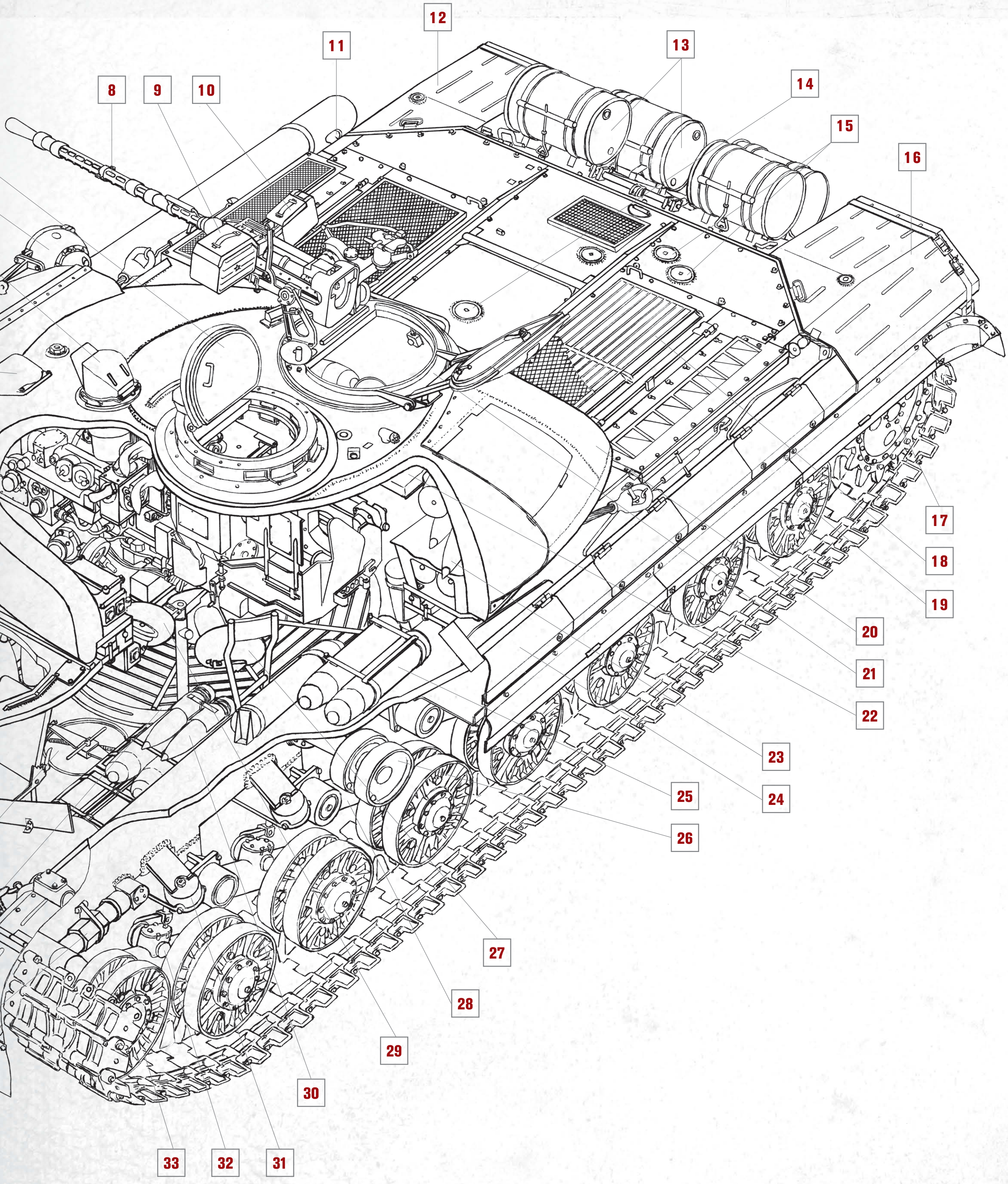


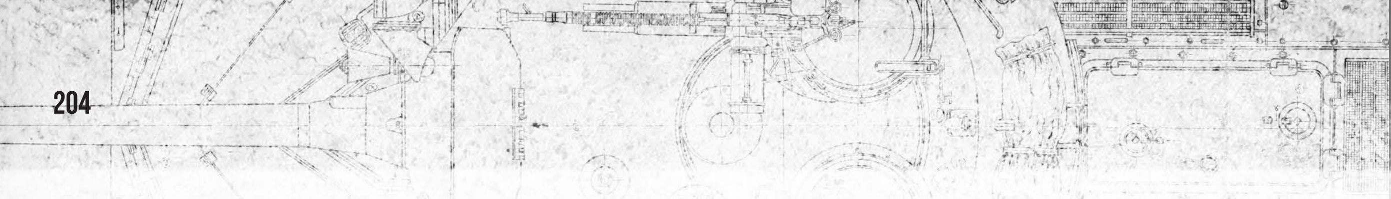
APPENDIX FOUR

T-10M CUTAWAY DIAGRAM

(Andrey Aksenov)

1	Multi baffle muzzle brake
2	Fume extractor
3	122mm M62-T2 (2A17) gun barrel
4	14.5mm KPVT co-axial MG
5	TPN-1-29-14 gun night sight
6	L-2 infrared gun searchlight
7	Commander's hatch
8	14.5mm KPVT AA MG
9	14.5mm ammunition box
10	Spent chain link receiver
11	Rear driving (convoy) light
12	External fuel tank
13	BDSh-5 smoke canisters
14	Engine cooling system filler cap
15	Fuel system filler caps
16	External fuel tank
17	Drive sprocket
18	Armoured radiator grille
19	Steel roadwheel
20	Turret bin
21	Loader's hatch
22	Loader's seat
23	Turret ammunition stowage
24	Side stowage bins
25	Hull ammunition stowage
26	Steel return roller
27	Tank commander's seat
28	Torsion arm
29	Gunner's seat
30	Front hull ammunition stowage
31	Spring shock absorber block (all wheel stations)
32	Hydraulic shock absorber (1st, 2nd and 7th wheel stations)
33	Idler wheel
34	Track tensioning device
35	Rotating turret floor
36	Escape hatch
37	Driver's seat
38	Glacis splash guards
39	Driver's hatch
40	Towing hook
41	Front mudguard hinged flap
42	Towing cable
43	Tool box
44	FG-101 headlight with night driving device
45	FG-100 IR headlight
46	Unditching beam
47	Turret lifting hook
48	T2S-29-14 'Udar' gunsight
49	Gun mantlet





APPENDIX FIVE

OBIEKT NUMBER LISTING OF T-10 TANKS, PROTOTYPES AND PROJECTS

Beginning in the late 1930s, the Soviet Union standardized a designation system relating to armoured vehicle designs projects while still at the development stage and not yet accepted for military service. These were known as 'Obiekti' (objects) or as 'Izdeliye' (articles), with each armoured vehicle designated by three digit number blocks that were assigned to each plant for ease of tracking and identification. Over the years these became defined as follows:

1xx – UVZ (Ural Railway Wagon Construction Plant), Nizhniy Tagil
2xx – LKZ: SKB-2 (Special Design Bureau 2) Chelyabinsk, Leningrad (today St Petersburg)
3xx – UZTM (Uraltrasmash), Sverdlovsk (today Ekaterinburg)
4xx – Kharkov Steam Locomotive Plant (later Malyshev Plant), Kharkov
5xx – Rubtsovsk Machinery Building Plant, Rubtsovsk
6xx – Omsk Plant for Transport Machinery Construction, Omsk (ex-Plant No. 174)
7xx – Chelyabinsk Kirov Plant/Chelyabinsk Tractor Plant, Chelyabinsk
8xx – LKZ missile related vehicle designs
9xx – Stalingrad Tractor Plant, Stalingrad (today Volgograd).

All vehicles related to the T-10 heavy tank series had 2xx, 7xx or 8xx designators.

T-10 VARIANTS BY OBIEKT NUMBER

Obiekt No.	Designation	Year of Introduction	Type	Production	Combat Weight (metric tonnes)	Description	Comment
Obiekt-27*	TEhS-3		Nuclear Generating Station	Series	90	Tracked nuclear generator plant	Small number built and tested in Russian far north.

* Obiekt-27 is as designated by LKZ, though Obiekt-27 and Obiekt-415 were both assigned to the KhTZ tank plant in Kharkov

Obiekt-2xx (LKZ Leningrad)

Obiekt No.	Designation	Year of Introduction	Type	Production	Combat Weight (metric tonnes)	Description	Comment
Obiekt-241	IT Istribitel Tank			Project	n/app	Design project for 'IT' tank hunter	Project to mount 85/130mm high-velocity S-133A/S-133S tank gun
Obiekt-242	ISU-152			Prototype		Test-bed vehicle	Prototype to test ejection cooling system as adopted on T-10 series
Obiekt-248	IS-5	1945–46	Heavy Tank	Prototype		IS-5 first prototype	Hull and engine test tank, no turret or armament installed
Obiekt-264	T-10M (LKZ)	1955		Prototype	50		122mm M-62-T2 and hydro-mechanical transmission
Obiekt-265		1954–55	Heavy Tank	Prototype	50		122mm D-25TEh with high-velocity (950m/s) rounds. Three prototypes built
Obiekt-266		1955	Heavy Tank	Prototype	50		Development of Ob.264, hydraulic torque converter and transmission
Obiekt-267	T-10 (LKZ)	1955		Series		LKZ built T-10	122mm D-25TA
Obiekt-267sp1	T-10A (LKZ)	1955		Series		LKZ built T-10A	122mm D-25TS, PUOT-1 'Uragan' vertical gun stabilization
Obiekt-267sp2	T-10B (LKZ)	1955–56		Series		LKZ built T-10B	PUOT-2* 'Grom' two-axis gun stabilization and night sights for armament
Obiekt-268		1956		Prototype	50	SPG variant of T-10	152mm M-64, 200mm armour basis. Prototype tested for service
Obiekt-269		1953–56	Heavy Tank	Prototype	50	Test-bed vehicle	Testing of gun sights and stereoscopic rangefinder systems
Obiekt-271	2A3 Kondensator	1957	Strategic Artillery System	Series	64	Tracked strategic gun-howitzer	Four built
Obiekt-272	T-10M (LKZ)	1955–57		Series	51.5	T-10M	122mm M-62-T2, two-axis 'Liven' stabilization
Obiekt-272K	T-10MK	1957	Command Tank	Series	51.5	Command tank	122mm M-62-T2, two-axis 'Liven' stabilization, TNA-2,GPK-52 navigation
Obiekt-272M		1957	Rocket Armed Heavy Tank	Prototype	51	Test-bed vehicle	Test mounting of 9M14 ATGM
Obiekt-273	2B1 Oka	1957	Strategic Artillery System	Series	55.3	Tracked strategic mortar	Four built
Obiekt-277		1958–60	Heavy Tank	Prototype	55	Potential T-10 replacement	130mm M-65, two-axis 'Groza' stabilization, 1090hp diesel engine
Obiekt-Eh277		1959		Prototype	n/a	LKZ/NII-24 development prototype	130mm M-65 with modified rifling and sub-calibre (APFSDS) rounds
Obiekt-278		1960	Heavy Tank	Prototype	53.5	Potential T-10 replacement	130mm M-65, two-axis 'Groza' stabilization, GTD engine
Obiekt-278	IT Istribitel Tank	1960		Project	n/app	Design project for 'IT' tank hunter	Project to mount 85/130mm high velocity S-133A/S-133S tank gun
Obiekt-278		1960		Project	n/app		Project to mount 140mm 'Rezets' smoothbore tank gun on Obiekt-278

Obiekt-279		1960	Heavy Tank	Prototype	60	VNII-100/ LKZ special purpose tank	130mm M-65, special 'saucer' hull, 4-track suspension system
Obiekt-281		1957	Rocket Armed Heavy Tank	Project	50	Fully automatic ATGM system	Developed to project design stage only
Obiekt-282		1957	Rocket Armed Heavy Tank	Prototype	45	Two ATGM systems	Prototype built and evaluated
Obiekt-282T		1957	Rocket Armed Heavy Tank	Prototype	45	Three ATGM systems	Prototype built and evaluated, latterly used to test GTD engine
Obiekt-284		1960		Prototype		Test-bed vehicle	Testing of stereoscopic rangefinder systems
Obiekt-285		1959	Rocket Armed Heavy Tank	Project	45	TRS-152 ATGM tested vehicle	
Obiekt-286		1959	Rocket Armed Heavy Tank	Project		LKZ developed ATGM test-bed vehicle	Developed to test 'Lotus' ATGM system
Obiekt-287		1964	Rocket Armed Heavy Tank	Prototype	25	Two ATGMs and PU launcher	Prototype built and evaluated
Obiekt-292				Project			130mm M-65, 800hp diesel engine

Obiekt-7xx (ChKZ/ChTZ Chelyabinsk)

Obiekt No.	Designation	Year of Introduction	Type	Production	Combat Weight (metric tonnes)	Description	Comment
Obiekt-705/705A		1946	Heavy Tank Design	Project			Early project considering concepts adopted on later Obiekt-730
Obiekt-709	T-10M (ChTZ)	1960	Test-bed Vehicle	Prototype		Test-bed vehicle for simplified transmission	6-speed transmission, smaller size also allows +100 litres of internal fuel
Obiekt-730	T-10 (ChKZ)	1950	Heavy Tank	Series	50	ChKZ built T-10	122mm D-25T, 2 x 12.7mm DShKM
Obiekt-730 SPG		1952–56	SPG variants of Obiekt-730	Project	50	SPG variants	Five design projects, later developed into the Obiekt-268
Obiekt-731	T-10A (ChKZ)	1955		Series		ChKZ built T-10A	122mm D-25TS, PUOT-1 'Uragan' vertical gun stabilization
Obiekt-733	T-10B (ChKZ)	1955–56		Series		ChKZ built T-10B	PUOT-2* 'Grom' two-axis gun stabilization and night sights for armament
Obiekt-734	T-10M (ChKZ)	1957–62		Series		ChKZ built T-10M	122mm M-62-T2, two-axis 'Liven' stabilization
Obiekt-739	T-10			Prototype			Test-bed vehicle for PPO automatic fire-fighting system
Obiekt-752	T-10			Project			122mm M-62-T2, magazine carousel in hull, new suspension
Obiekt-755	T-10	1957	PST	Prototype			T-10 with pontoons for rapid waterborne assault, tested for service
Obiekt-755	T-10M	1959	PST	Prototype			Continuation of earlier trials now using T-10M as test-bed vehicle
Obiekt-756	T-10M	1958	Test-bed Vehicle	Prototype			Test-bed vehicle for radiation lining and PAZ NBC overpressure system
Obiekt-757		1958–60	Rocket Armed Heavy Tank	Prototype			125mm D-126 PU launcher for 'Kobra' and 'Rubin' guided ATGMs
Obiekt-763				Project			Design project only
Obiekt-770		1957	Heavy Tank	Prototype		ChKZ potential replacement for T-10	130mm M-65, 10 cylinder, 1,000hp prototype diesel engine

Obiekt-770	IT Istribitel Tank			Project	n/app	Design project for ‘IT’ tank hunter	Project to mount 85/130mm high velocity S-133A/S-133S tank gun
Obiekt-770				Project	n/app		Project to mount 140mm ‘Rezets’ smoothbore tank gun on Obiekt-770
Obiekt-777	T-10		Heavy Tank	Project			Potential major re-design of the T-10
Obiekt-8xx LKZ Missile Tank variants							
Obiekt No.	**Designation**	**Year of Introduction**	**Type**	**Production**	**Combat Weight (metric tonnes)**	**Description**	**Comment**
Obiekt-803	8U218 (8K11)	1956	SPU Vehicle for OTR	Series	40		8K11 (NATO: ‘SCUD A’), 170km range
Obiekt-804		1956	SPU Vehicle for OTR	Series	40		2P2 (NATO: ‘FROG-1’), 26km range
Obiekt-805			Reloading Vehicle	Prototype			Rocket reloading vehicle using T-10 components
Obiekt-807			Multiple Rocket Launcher	Project		LKZ Multiple Rocket Launcher (MRS) design	3 round 410mm MRS using T-10 components
Obiekt-808			TU Vehicle	Project		LKZ design for TU vehicle	Transporter-Loader (TU) vehicle using T-10 components
Obiekt-810			SPU Vehicle for R-11M	Series	49	LKZ design for OTR SPU vehicle	
Obiekt-811		1959	Tracked Crane	Prototype	45	Tracked crane on T-10 chassis	10 tonne lift capacity
Obiekt-814		1962–65	SPU Vehicle for OTR	Series	30.2	TU vehicle for loading naval R-27 rockets	Small number built
Obiekt-815sp1	RT-15 Version 1	1961–65	SPU Vehicle for MRBM	Prototype	42	SPU vehicle for 8K96 MRBM rocket	Small number built (NATO: SS-14)
Obiekt-815sp2	RT-15 Version 2	1961–65	SPU Vehicle for MRBM	Prototype	42	SPU vehicle for 8K96 MRBM rocket	Small number built (NATO: SS-14)
Obiekt-816	2P19	1963	SPU Vehicle for OTR	Prototype	38	SPU vehicle for R-17 OTR rocket	2P19 (NATO: ‘SCUD B’). Based on ISU-152 with T-10M components
Obiekt-817			SPU Vehicle for OTR	Prototype		SPU vehicle for OTR rocket	2P19 based prototype with crane. Dropped due to MAZ-543/9P117
Obiekt-818		1963–65	SPU Vehicle	Prototype	42	SPU vehicle for MRBM/ICBM rocket	Prototype only
Obiekt-819		1963–65	SPU Vehicle	Prototype	42	SPU vehicle for MRBM/ICBM rocket	Prototype only
Obiekt-820	RT-20P	1967–70	SPU (TU) Vehicle for ICBM	Prototype	78	SPU (TU) vehicle for 8K99 ICBM rocket	Small number built for evaluation trials purposes
Obiekt-821	RT-20P	1967–70	SPU Vehicle for ICBM	Project	79	SPU vehicle for 8K99 ICBM rocket	Project developed into RSD-10 ‘Pioner’, mounted on MAZ-547 chassis
Obiekt-825sp2		1967–70	SPU Vehicle for ICBM	Prototype	74	SPU vehicle for Temp-2S ICBM rocket	Planned SPU to transport and launch Temp-2S (NATO:SS-16) ICBM rocket
n/a	2S7 prototype		2S7 SPG	Project		LKZ project to mount 203mm 2A44 on T-10M	Potential 2S7 SPG. LKZ later built 2S7 from T-80 MBT components
** PUOT and PUST terms are interchangeable							

APPENDIX SIX

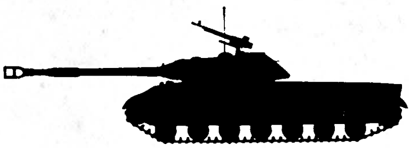
FOREIGN PERSPECTIVES: T-10 RECOGNITION DURING THE COLD WAR

From a foreign perspective, the T-10 was similar to the T-64 and T-80 MBTs and its heavy tank predecessor the IS-4 in that none of these tanks was exported and therefore they remained far more enigmatic than most other Soviet era tanks.

The T-10 was paraded only once on Moscow's Red Square, when T-10B tanks trundled across it on 7 November 1957 for the first and last time in Soviet history. This singular parade appearance was to become the basis for military recognition manuals throughout NATO. For the purposes of AFV recognition, particularly by armoured units, the T-10 was basically a modernized IS-3 with similar characteristics and a similar silhouette. The US Defence Intelligence Agency noted in its Warsaw Pact equipment handbooks that the T-10 was slower than Soviet MBTs but powerfully armed and heavily armoured. It also noted that despite being classified as a heavy tank it was comparable with the M60 and actually lighter than the British Chieftain MBT.

The later T-10M was actually better known to Western intelligence, in that T-10M tanks located with the Group of Soviet Forces in East Germany were paraded in Berlin and occasionally in other cities such as Dresden, which gave those with a professional interest the ability to photograph the tanks during these events. These photographs also became standard fare in

T10



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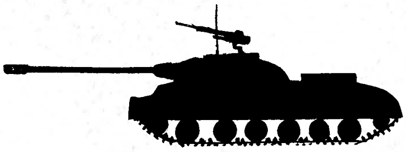
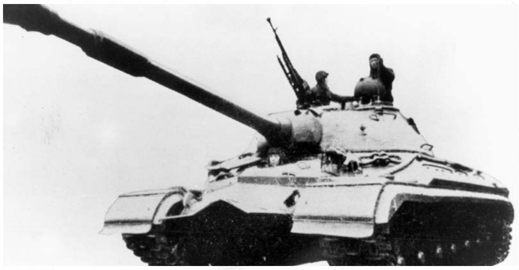
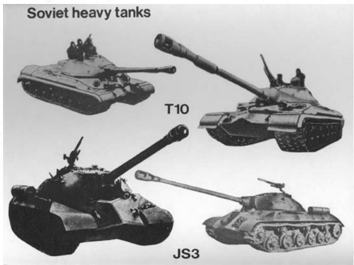


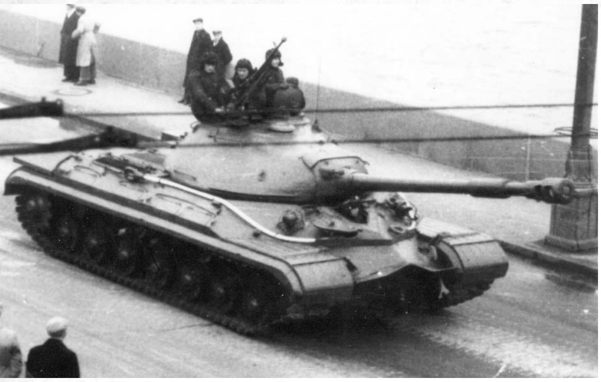


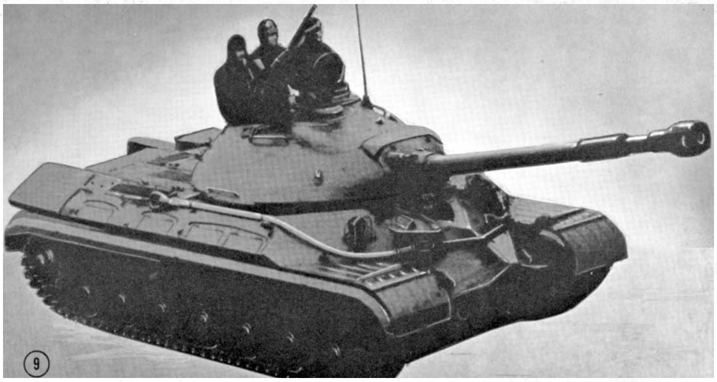


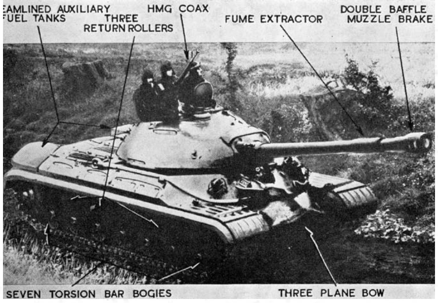
MIDDLE LEFT AND RIGHT: In silhouette, the T-10 is similar to, but actually completely different from, the IS-3, or JS-3 as formerly designated in the West.

BOTTOM LEFT: The T-10B as photographed in Moscow in November 1957 became a stock illustration in British military recognition manuals. (Tank Museum 2646/F3)

BOTTOM RIGHT: A recognition manual guide comparing the IS-3 and T-10, using the stock parade photograph of the T-10B taken on Red Square on 7 November 1957 as a basis.







NATO recognition manuals. The tank was also occasionally successfully photographed during exercises or on the move in East Germany. Due to agreements between the Soviet Union and NATO, British 'Brixmis' mission military specialists based in Potsdam had accreditation to observe certain well defined activities and thereby played a specific role in photographing new and unusual military vehicles. The US had a similar but far smaller 'USMLM' delegation based in Berlin and Potsdam. As might be expected, these specialists had a tendency to get lost and then wander about with cameras in hand until intercepted, and were an invaluable source of information on the Soviet threat as then perceived. The activity of all these units was curtailed on 2 October 1990 with the re-unification of Germany and the removal of Soviet troops from the country.

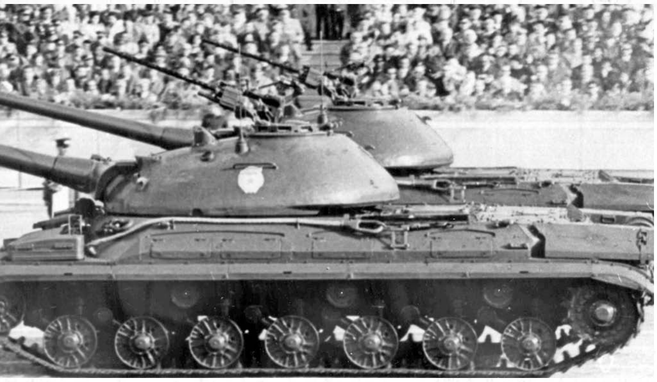
The T-10M had what might be termed its public debut in Czechoslovakia in 1968 when tanks (primarily of the 9th Heavy Tank Division) were widely photographed on the streets of Plzen and in the surrounding countryside, complete with long range fuel tanks, additional fuel tanks and white recognition crosses.

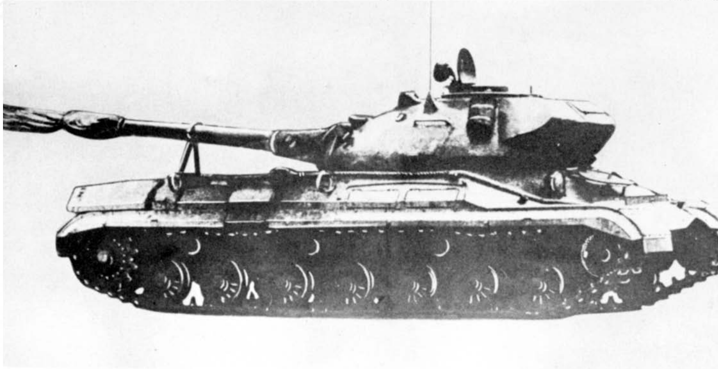
By the mid 1960s, when it was still in its final months of production, the T-10 was already an anachronism, having been technically outmoded by the arrival of the Main Battle Tank armed with smoothbore tank guns capable of firing conventional and new ammunition types, and by the mass deployment of anti-tank guided missiles, which were as effective as a tank gun against armour and could be mounted on relatively lightweight vehicle chassis. The T-10 was therefore gradually moved to strategic reserve storage before being

ABOVE LEFT: A T-10B, photographed from a bridge over the Moskva River on leaving Red Square along the Naberezhny embankment, 7 November 1957. This exact tank became the default NATO illustration of the early T-10.

ABOVE RIGHT: In the pre-digital world, much time was spent manually altering photographs to remove their original background before they appeared in military recognition manuals.

ABOVE: This British recognition photograph indicates the T-10's primary features of interest to types such as Int.Sy. and tank gunners. The origins of the photograph are clear, though some time has been spent moving the tank from Red Square to the countryside. The location arrow for the co-axial DShKM has also slightly missed the mark.





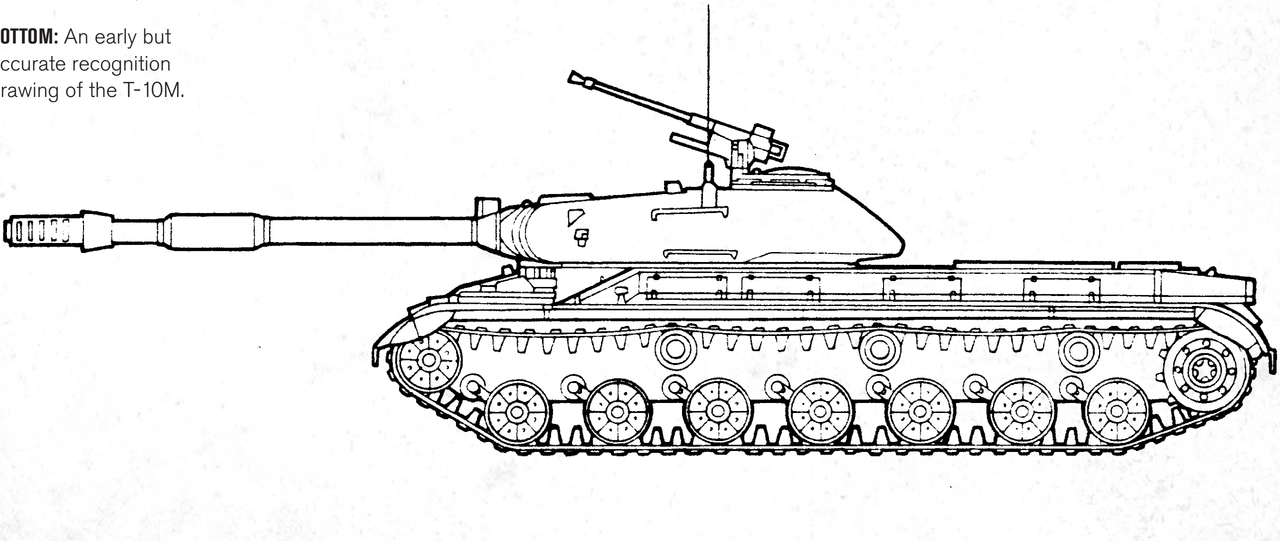
TOP LEFT: East Germany was a ready source of later T-10 photographs due to military parades held there where GSFG T-10M tanks were displayed, such as this one in Berlin in Soviet Guards Tank Army markings. Originally this tank was referred to as a T-10B as it had a new muzzle brake, but it was later changed to T-10M.

TOP RIGHT: Another British recognition guide illustration depicting a T-10M. Again, the background is painted out, but the tank was clearly photographed in transit, most probably during transit by rail.

BOTTOM: An early but accurate recognition drawing of the T-10M.

officially removed from service in 1993. By the 1970s, the T-64, T-72 and latterly the T-80 took precedence in the training of military personnel, and the T-10 gradually disappeared from NATO recognition manuals, having been considered obsolescent for some time. As late as 1980, however, the US DIA still noted that, though obsolescent, the T-10 and T-10M were 'nonetheless formidable weapons systems', a candid description intended for consideration by military personnel expected to engage in combat rather than the general public.

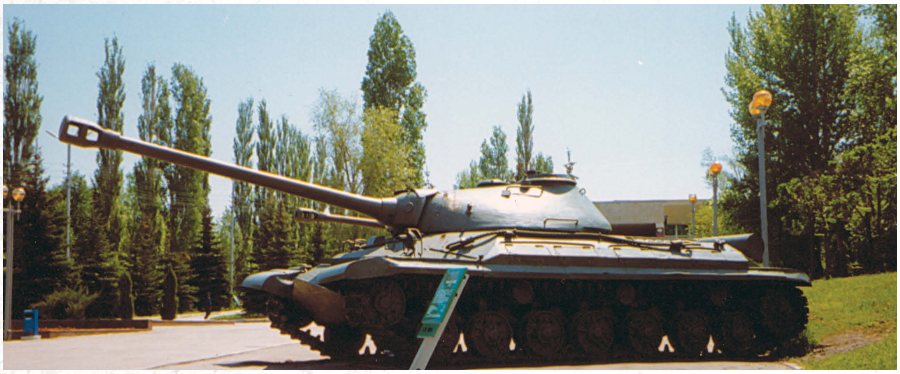
The illustrations in this appendix are all from declassified military recognition manuals that were classified 'restricted' at the time of their initial publication and circulation before being declassified in later years. As is often the case in officialdom, most of the original photographs have long since been binned as being no longer of interest or value.



APPENDIX SEVEN

PRESERVED T-10 TANKS

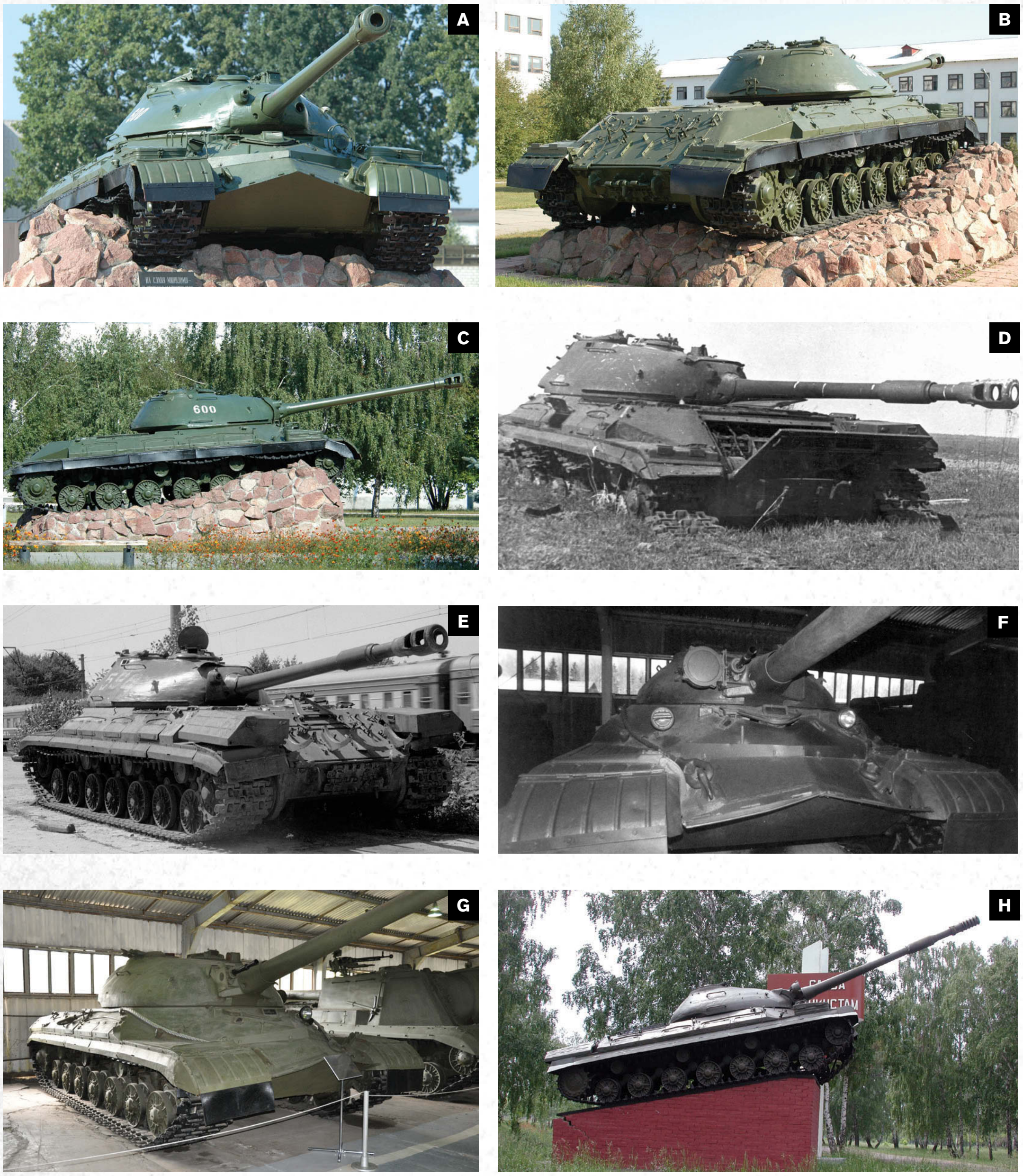
The T-10 and T-10M were already considered obsolescent at the time of the Soviet and Warsaw Pact invasion of Czechoslovakia during Operation *Dunay* in 1968. In the following years, the T-10 series continued to be withdrawn from service and kept in strategic storage. In 1989 the Soviet Union began to scrap some of its tanks in the European part of the country in accordance with Conventional Forces Europe (CFE) treaty obligations. Significant numbers of T-10 series tanks located in Ukraine and Belarus were transported to depots where they were dismantled and in some cases melted down for scrap, a process that accelerated after the collapse of the Soviet Union in 1991. A few T-10 series heavy tanks were preserved as monuments within military garrisons and to replace older tanks on war memorials, with preserved T-10 series tanks being relatively common in Belarus and Ukraine. Some T-10 series tanks were used as range targets, while others such as the T-10M located at the Central Armed Forces Museum in Moscow were taken straight from strategic reserves in pristine condition in 1993 and put on museum display. Though relatively obscure during its service life, the T-10 series has been remarkably well preserved for posterity compared to many other Soviet era tanks. There are examples of early T-10, T-10A and T-10B models preserved to the present day in addition to the more commonly observed T-10M, reflecting the fact that the earlier T-10 and T-10M were effectively distinct tank types, and the earlier tanks did not undergo major modernization at tank repair plants (TRZs) in later life. This alone has been of great benefit, in that this book can therefore illustrate several early T-10 models preserved today in relatively untouched condition as they appeared in service.



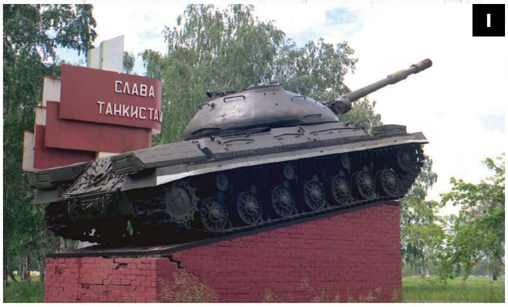
This T-10 located in the Russian city of Saratov is from the original batch of 200 tanks produced without gun stabilization, bore evacuator or other later additions.

PRESERVED T-10 HEAVY TANKS

Country and City	Region (oblast)	Specific Location	Access O = Open R = Restricted	Tank Model	Comments
Belarus					
Korovatychy	Gomel		O	T-10M	Plinth mounted in the town commemorating the 1941–45 Great Patriotic War'
Minsk		Kurgan Slava Memorial	O	T-10M	
Zaslavl	Minsk	Stalin Line Museum	O	T-10M	Moved to museum directly from strategic reserves, probably with 5th Heavy Tank Division
Zaslavl	Minsk	Stalin Line Museum	O	T-10M	Moved to museum directly from strategic reserves, probably with 5th Heavy Tank Division
Russian Federation					
Arkhangelskoe	Moscow	Muzei Tekhnika Vadim Zadorozhny	O	T-10M	Restored from an abandoned wreck
Krasnoznamensk	Moscow (?)		O	T-10	Early T-10 without later T-10A/B modifications
Krasnoznamensk	Kaliningrad		O	T-10	
Kubinka	Moscow	Kubinka Tank Museum	O	Obiekt-266	Experimental T-10 variant used to test new hydraulic transmission system
Kubinka	Moscow	Kubinka Tank Museum	O	Obiekt-268	Self-propelled gun variant of T-10 series
Kubinka	Moscow	Kubinka Tank Museum	O	T-10	Early model T-10 used in initial evaluation for service
Kubinka	Moscow	Kubinka Tank Museum	O	T-10M	T-10M in running condition
Magnitogorsk	Chelyabinsk		O	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Moscow		Central Armed Forces Museum	O	T-10M	Moved to museum directly from strategic reserves in 1993
Moscow		Izmailova Sports Stadium	R	T-10M	T-10M, part of Zheleznaya Division Club collection, at entrance to Soviet era bunker system
Omsk		Omsk Tank Officers Academy	O	T-10M	Plinth mounted at the entrance to the Tank Academy
Saratov		Victory Park	O	T-10	Located within the expansive collection
Ussurisk	Eastern Siberia	Military Museum	O	T-10	
Ukraine					
Apostolovo	Dnipropetrovsk	Roadside memorial	O	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Buki	Cherkassy		O	T-10M	Plinth mounted T-10M commemorating the 1941-45 Great Patriotic War
Cherkassy		Roadside memorial	O	T-10	Early T-10 without later T-10A/B modifications
Dmitrovka	Dnipropetrovsk		O	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Drabiv	Cherkassy		O	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Goncharovskoye	Chernigov	Military base	R	T-10	Early T-10 plinth mounted on territory of tank garrison. Three colour camouflage scheme
Gvardeyskoye	Dnipropetrovsk		O	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Kagarlyki	Kiev	Memorial at Pl. Pobedy (Victory Square)	O	T-10A	Plinth mounted T-10A



(A) This early T-10 with T-10B modifications was released from strategic reserve storage – specifically with the 1st Independent Tank Brigade – in 1997 and is now located as a memorial on a Ukrainian military base. **(B)** This rear view of the same tank clearly shows the chamfered rear hull shape where the reserve fuel tanks were usually located in service. **(C)** The early T-10 in its basic production form had no gun stabilization, no TPS-1 gyroscopic sight mounted on the top left of the turret and no bore evacuator. **(D)** The fate of many T-10 tanks, particularly the early pre-T-10M tanks, was to end up as range targets. **(E)** A recently decommissioned T-10B awaits being broken up for scrap, Bucha Rail Station, Ukraine, 1989. **(F)** It was only a few years ago that all preserved T-10 tanks were unknown to Westerners. Here is the Kubinka T-10M, photographed in 1993 when foreigners visiting Kubinka required state security service clearance. **(G)** The same T-10M in Kubinka, together with the T-10A and other variants such as the Obiekt-268, are today somewhat easier to access, and digital photography to some extent compensates for the atrocious lighting conditions within the tank halls. **(H)** This T-10M is plinth mounted at the entrance to the Tank Officers' School near Omsk.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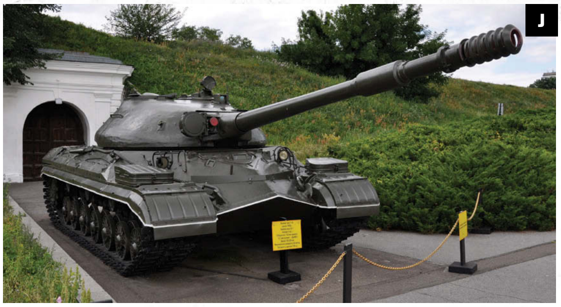
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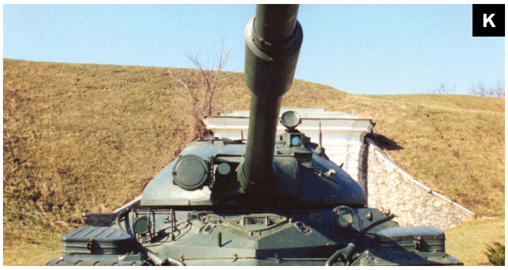
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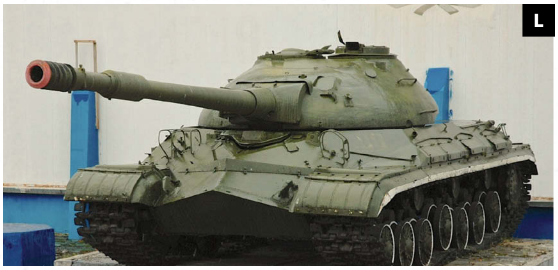
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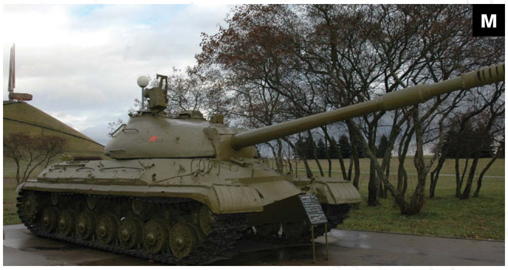
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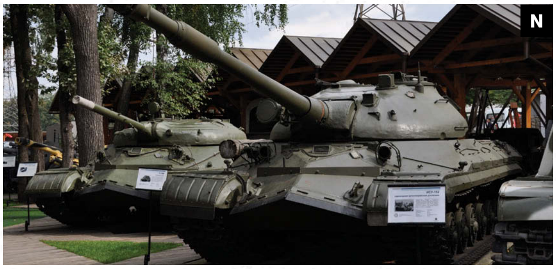
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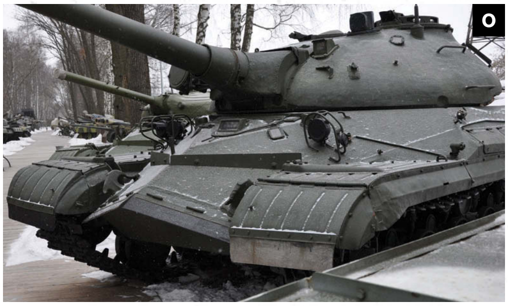
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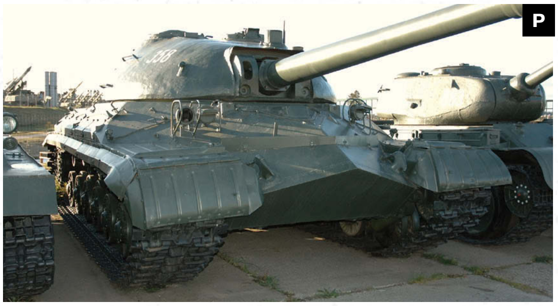
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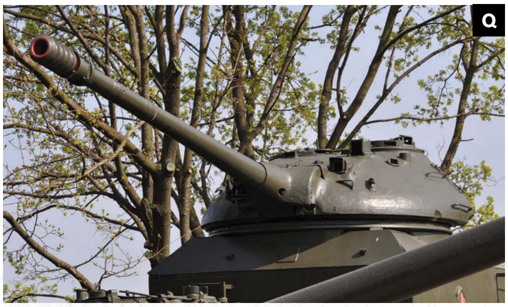
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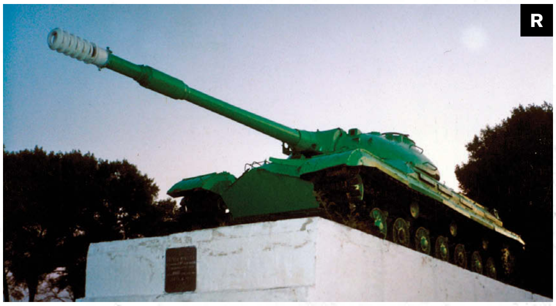
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Country and City	Region (oblast)	Specific Location	Access 0 = Open R = Restricted	Tank Model	Comments
Ukraine					
Kiev		Great Patriotic War Memorial Museum	0	T-10M	Moved to museum directly from strategic reserves
Kiev		Institute, Marshal Yakubovsky Ul.	0	T-10A	Turret only, plinth mounted within the institute grounds
Kiev		Institute, General Naumov Ul.	0	T-10M	Turret only, plinth mounted within the institute grounds
Komsomolsk	Poltava		0	T-10M	Located together with an IS-3M and ISU-152
Krivoi Rog		Gagarin Park	0	T-10	Early T-10 without later T-10A/B modifications
Krivorozhe	Donetsk		0	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Krivorizka	Dnipropetrovsk		0	T-10M	Plinth mounted T-10M located in a local park
Lutsk		Military Museum	0	T-10M	
Oktyabr Donetskoi	Donetsk		0	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Pokrovske	Dnipropetrovsk		0	T-10M	Plinth mounted T-10M commemorating the 1941–45 Great Patriotic War
Putilov	Sumy	Roadside memorial	0	T-10M	Commemorating liberation of the city by 150th Independent Tank Brigade
Saurov	Donetsk	Military Museum	0	T-10M	
Snezhnoye	Donetsk	Savur Mohyla Memorial Complex	0	T-10M	T-10M located with T-34-85 and SU-100. The hill was the scene of fighting again in 2014
Verbki	Dnipropetrovsk	Roadside memorial	0	T-10	Plinth mounted early T-10 without later T-10A/B modifications

(I) Rear view of the same T-10M at the Tank Officers' School, Omsk. **(J)** There are many surviving T-10 tanks in Ukraine. This T-10M is located at the Great Patriotic War Memorial Museum in Kiev. **(K)** The T-10M at the Great Patriotic War Memorial Museum, Kiev, an impressive tank by any standards. **(L)** This T-10M is located within the Izmailova Sports Stadium in Moscow. It stands at the entrance to a Cold War bunker complex that could house and maintain 75,000 people. **(M)** A T-10M located at Kurgan Slava (Glory Mound), on the outskirts of Minsk, Belarus. The tank is parked alongside an IS-3M and an IS-2M, a complete lineage in one location. **(N)** This T-10M is located at the Muzei Teknika (the Vadim Zadorozhny Museum) near Krasnogorsk on the western outskirts of Moscow. The Obiekt-757 rocket tank prototype is located alongside. **(O)** The T-10M is one of a multitude of rare and often unique military vehicles on display at the Muzei Tekhnika. This tank was restored from a wreck that had stood in the open for many years. **(P)** The Stalin Line Museum near Minsk in Belarus has two T-10Ms in its collection, both taken directly from strategic reserve storage. **(Q)** This curiosity, a T-10M turret mounted on an armoured train at the Great Patriotic War Memorial Museum in Kiev, is the Ukrainian equivalent of a British 'folly'. The turret and armament are original, however. **(R)** This T-10M plinth mounted at a road junction near Putilov in Ukraine is one of many located in Ukraine and Belarus, where surviving T-10s outnumber those in the Russian Federation, reflecting their service and storage locations.

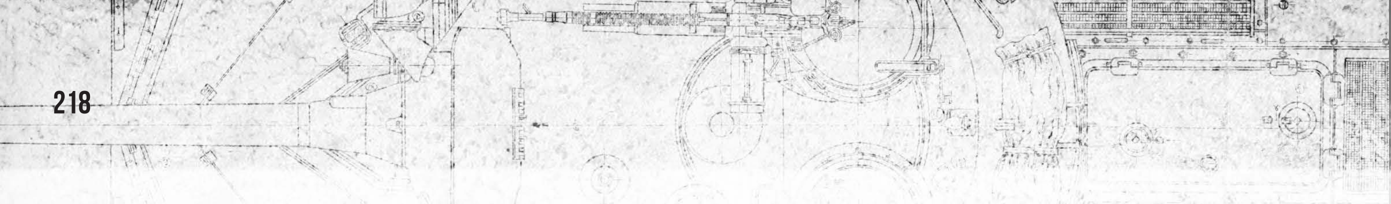
APPENDIX EIGHT

T-10 AND VARIANT SPECIFICATIONS: DATA TABLES

T-10 SPECIFICATIONS: GUN TANK VARIANTS

Designation	T-10	T-10A	T-10B (Ob.267sp2)	T-10M	T-10M	Obiekt-266	Obiekt-277
Obiekt No.	Ob.267, Ob.730	Ob.267sp1, Ob.731	Ob.267sp2, Ob.733	Ob.272	Ob.734	n/a	n/a
Design Bureau/Plant	ChTZ/LKZ	ChKZ	ChKZ	LKZ	ChKZ (ChTZ)	LKZ	LKZ
Year of Test or Introduction	1953	1956	1957	1957	1957	1957	1957
Years Produced	1953–57	1956	1957	1957–66*	1957–62*	Prototype	Prototype
Crew	4	4	4	4	4	4	4
Combat Weight (metric tonnes)	50	50	50	51.5	50	50	55
Armament							
Main Armament	122mm D-25TA	122mm D-25TS	122mm D-25TS	122mm M-62-T2	122mm M-62-T2	122mm D-25TA	130mm M-65
Range (direct fire – 2m target) (m)	3,500	3,500	3,500	5,000	5,000	3,500	1,230–2,150
Range (indirect fire) (m)	14,700	14,700	14,700	15,000	15,000	14,700	15,000
Rate of Fire (rpm)	2–3	2–3	2–3	3–4	3–4	3–4	4–5
Main Armament Sights	TSh2-27, TPKU	TPS-1,TUP	T2S-29-14	T2S-29-14,TPN-1	T2S-29-14,TPN-1	T-2S	TPDS/TPN-1
Main Armament Stabilization	None	1 axis (vertical)	2 axis	2 axis	2 axis	2 axis	2 axis
Stabilization and Fire Control	None	PUOT-1 'Uragan'	PUOT-2 'Grom'	PUOT-2S 'Udar' (Liven)	PUOT-2S 'Udar' (Liven)	PUOT-2 'Grom'	'Groza'
Secondary Armament	2 x 12.7mm DShKM	2 x 12.7mm DShKM	2 x 12.7mm DShKM	2 x 14.5mm KPVT	2 x 14.5mm KPVT	2 x 12.7mm DShKM	1 x 14.5mm KPVT
Ammunition							
Ammunition (main armament)	30	30	30	30	30	30	26–35
Ammunition (secondary armament)	1,000	1,000	1,000	744	744	1,000	250
Armour							
Hull Glacis (upper) (mm)	120	120	120	120	120	120	140
Hull Side (upper) (mm)	80	80	80	80	80	80	112
Hull Side (lower) (mm)	50–60	50–60	50–60	50–60	50–60	50–60	97
Hull Rear (mm)	60+50						50/20–50
Turret Front (mm)	200–250 per Kub	200–250	200–250	250	250	200–250	290/30–60

Dimensions							
Length (gun forward) (m)	9.715	9.715	9.715	10.560	10.560	9.715	10.15 (11.78?)
Length (hull) (m)	7.25	7.25	7.25	7.25	7.25	7.25	n/a
Width (m)	3.388	3.388	3.388	3.388	3.388	3.388	3.388
Height (turret roof) (m)	2.46	2.5	2.5	2.345	2.585	2.46	2.5
Ground Clearance (m)	0.46	0.46	0.46	0.46	0.46	0.45	0.46
Length of Track on Ground (m)	4.55	4.55	4.55	4.55	4.55	4.55	n/a
Engine, Transmission, Power							
Engine	V-12-5	V-12-5	V-12-5	V-12-6B	V-12-6B	V-12-5	V-12 M-850
Fuel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Fuel (internal + external) (litres)	460+300	930 total	930 total	950 total	940 total	930 total	820+250
Power Output (hp)	700	700	700	750	750	700	1,090
Transmission	Planetary 8 Sp	Planetary 8 Sp	Planetary 8 Sp	Planetary 8 Sp (6 Sp)	Planetary 8 Sp (6 Sp)	Planetary 8 Sp/Hydr.	Planetary 8 Sp
Combat Weight (metric tonnes)	50	50	50	50	50	50	55
Power/Weight Ratio (hp/tonne)	14	14	14	14.6	15	14	19.8
Performance							
Maximum Road Speed (km/h)	42	42	42	53	51	42	55
Maximum Road Range (km)	200–230 (420)**	230	230	280 (340)	350	n/a	300
Angle of Approach (deg)	30	30	30	30	30	35	30
Angle of Departure (deg)	32	32	32	35	32	32	32
Trench (m)	2.7	2.7	2.7	3	3	2.7	3
Vertical Obstacle (m)	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Fording (m)	1.5	1.5	1.5	1.5 (5 with OPVT)	1.5	1.3	1.5
Ground Pressure (kg/cm^2)	0.74	0.74	0.74	0.77	0.77	0.77	0.73
Communications							
Radio	10RT-26Eh (R-113)	R-113	R-113	R-113	R-113	R-113	R-113
Internal Communications (TPU)	TPU-47-2	R-120	R-120	R-120	R-120	R-120	R-120
* T-10M produced 1957-62 at LKZ as Obiekt-272 and ChTZ as Obiekt-734. From 1962 to 1966 production at both plants was standardized on the Obiekt-272							
** with additional external fuel tanks							
n/a = Not Available							



T-10 SPECIFICATIONS – PROTOTYPES

Designation	**Obiekt-268**	**Obiekt-279**	**Obiekt-282T**	**Obiekt-752 (Project)**	**Obiekt-757 (Project)**	**Obiekt-770 (Project)**	**Obiekt-777 (Project)**
Tank Design Bureau/Plant	LKZ	LKZ	LKZ/ NII (several)	ChTZ/LKZ	ChTZ/LKZ	ChTZ/LKZ	ChTZ/LKZ
Weapon Design Bureau/ Plant	Plant No. 172	Plant No. 172	NII-48	n/app	KBM/NII-147	Plant No. 172	n/app
Year of Test or Introduction	1955	1957	1959	Design Project	1963	1960	Design Project
Years Produced	Prototype	Prototype	Prototype	Prototype	Prototype	Prototype	Prototype
Crew	4	4	2	4	2–3	4	4
Combat Weight (metric tonnes)	50	60	44	45.3	44	60	49.8
Armament							
Main Armament	152mm M-64	130mm M-65	TRS-152 (TRS-132)	122mm M-62-T2	125mm D-126S*	130mm M-65	122mm M-62-T2
Range (direct fire - 2m target) (m)	900	1,230–2,150	3,000(e)	n/a	4,000 (9,000)	1,230–2,150	1,230–2,150
Range (indirect fire) (m)	13,000	13,000	n/app	n/a	n/app	15,000	15,000
Rate of Fire (rpm)	3–4	3–4	n/a	n/a	4–5 (8–10)	3–4	n/a
Main Armament Sights	TSh-2A/ TKD-09/ZiS-3	n/a	Optical and radar	TPS-1	n/a	n/a	TPS-1
Main Armament Stabilization (axis)	2	2	2	2	2	2	2
Secondary Armament	14.5mm KPVT	14.5mm KPVT	n/app	14.5mm KPVT	7.62mm SGM	14.5mm KPVT	7.62mm SGMT
Additional Armament	n/app	n/app	n/app	n/a	n/a	n/app	14.5mm KPV (AA)
Ammunition Complement							
Ammunition (main armament)	30	24	22 (30) (e)	40	n/a	n/a	40
Ammunition (secondary armament)	500	300	n/app	1,000	n/a	n/a	3,000
Armour							
Hull Glacis (upper) (mm)	120	269	150	215		120	132
Hull Glacis (lower) (mm)						65–84	175
Hull Side (upper) (mm)			60	125			115
Hull Side (lower) (mm)			60	60			105
Hull Rear (mm)				45			45
Turret Front (mm)	187	305		260		305	195
Turret Side (mm)	100						215
Turret Rear (mm)	50						90

Dimensions							
Length (overall) (m)		10.238		9.745		10.15	9.8
Length (gun forward) (m)				9.745		10.15	9.8
Length (gun rear) (m)				8.925			9.8
Length (hull) (m)	6.925						
Width (m)		3.4		3.4		3.388	3.4
Height to Turret Roof (m)	2.462**	2.475	2.1	2.3		2.42	2.1
Ground Clearance (m)				0.51			0.425
Engine, Transmission, Power							
Engine	V-12-6	DG-1000 (2DG-8M)	V-12-F	V-12-6	n/a	10 cyl DTN-10	V-12 gas turbine
Fuel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Multifuel
Power Output (hp)	750		1,000	800		1,000	850
Fuel (internal+external) (litres)		950 (1,000)		200+500+300			650+350
Transmission	Planetary 8 sp	Planetary 8 sp	Planetary 8 sp	Hydro-Mechanical	n/a		Planetary 7 sp
Power/Weight Ratio (hp/tonne)				17.5			17
Performance							
Maximum Road Speed (km/h)	48	55	55	50	n/a	55	50
Maximum Road Range (km)		250		250	n/a	200	250
Angle of Approach (deg)				35			35
Angle of Departure (deg)				35			35
Fording (m)		1.2		4		1	
Ground Pressure (kg/cm^2)			0.75	0.75			0.75
Communications							
Radio							RTU 'Yasen'
Internal Communications (TPU)							TPU-5 'Biser'
* The Obiekt-757 was designed to fire the guided 'Rubin' or unguided 'Bur' rockets (latter details in brackets)							
** Figures refer to casemate rather than turret							
e = estimated							
n/a = not available							
n/app = not appropriate							

T-10 BASED STRATEGIC ARTILLERY, OTR, MRBM AND ICBM ROCKET SPU VEHICLES

Designation	**2A3 Kondensator**	**2B1 Oka**
Obiekt Number	Obiekt-271	Obiekt-273
System Designation (GAU)	2A3	2B1
NATO Designation		
Chassis Designation	Obiekt-271	Obiekt-273
Description	Strategic Gun	Strategic Mortar
Design Bureau/Plant	TsKB-34/LKZ	TsKB-34/LKZ
Year of Test or Introduction	1957–60	1957–60
Years Produced	1957 (four built)	1957 (four built)
Crew	1 + 6	1 + 6
Overall Vehicle Weight (metric tonnes)	64	55.3
Armament		
Calibre (mm)	406.4	420
Shell Weight (kg)	570	680 (750*)
Range (m)	25.6	25.0 (45.0)*
Muzzle Velocity (m/s)	716	n/a
Rate of Fire (rounds per five minutes)	1	1
Ammunition Complement	1	1
Overall Dimensions		
Length (gun forward) (m)	20 (e)	20.02
Length (hull) (m)	n/a	n/a
Width (m)	3.08	3.08
Height (m)	5.75	5.73
Engine, Transmission, Power		
Engine	V-12-6B (modified)	V-12-6B (modified)
Fuel	Diesel	Diesel
Fuel Capacity (litres)	n/a	n/a
Power Output (hp)	750	750
Transmission	Planetary 8sp	Planetary 8sp
Power/weight ratio (hp/tonne)	11.7	13.6
Performance		
Maximum Road Speed (km/h)	30	30
Maximum Road Range (km)	n/a	200–220
(a) = approximate		
n/a = not available		
n/app = not appropriate		
* from conflicting original sources		

Designation	2K4 Filin	8K11	8K14	15P696	15P699
Obiekt number	Obiekt-804	Obiekt-803	Obiekt-810	Obiekt-815sp1	Obiekt-821
System/Rocket designation	2K4 Filin (ZR-2)	8K11/R-11	8K14/R-17	8K96	8K99
NATO designation	'FROG-1'	SS-1b 'SCUD A'	SS-1c 'SCUD B'	SS-14 'Scamp'	SS-15 'Scrooge'
Chassis designation	2P4 Tuilpan	8U218		15U59	15U21
Description	OTR	OTR	OTR	MRBM	ICBM
Design Bureau/Plant	NII-1/LKZ	OKB-586/LKZ	OKB-586/LKZ	OKB-1,OKB-586, KB-3, etc	OKB-1,OKB-586, KB-3, etc
Year of Test or Introduction	1956–57	1956		1962–65	1963–67
Years Produced					
Crew				3	
Overall SPU Vehicle weight (metric tonnes)	40	40	49	42	78.9
Rocket System				29.96	
Range (km)	26–40	170	300	2,500	8,000 or 11,000
Warhead (Kt = nuclear)	5–10	5–100	5–300	600Kt	400kt/1.0Mt
Launch Weight (tonnes)	4.93			16	30–30.2
CEP Probability (m)	n/a		700	900	2,000–4,000
Rocket Length (m)	9.5–1.00			11.93/12*	17.48/17.8
Rocket Body Diameter(s) (m)	0.85/0.612			1.19 and 1.49*	1.6
SPU Vehicle Dimensions					
Length (overall) (m)	9.33			14.8	20
Length (with TPK) (m)	9.33			14.8	20
Length (hull) (m)					
Width (m)	3			3.3	4.4
Height (transit) (m)	3.07				3.15
Height (launch) (m)				15.2	
TPK Container				15Ya25 (later model)	
Length (m)				12.7	
Diameter (m)				2.1	
Material				GRP	
Engine, Transmission, Power					
Engine	V-2-10			V-35T	V-35T
Fuel	Diesel			Diesel	Diesel
Fuel Capacity (litres)				2,500	n/a
Power Output (hp)	520			760	760
Transmission				Planetary 8 sp	Planetary 8 sp
Power/Weight Ratio (hp/tonne)	13			12.5	

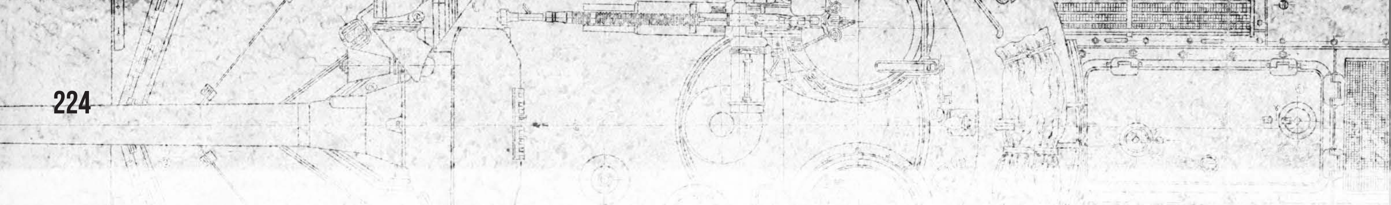
Performance	2K4 Filin	8K11	8K14	15P696	15P699
Maximum Road Speed (km/h)	30			30–40	35–40
Maximum Road Range (km)	300–350			250	
Ground Pressure (kg/cm2)	0.67			0.78	
Trench (m)				3	
Vertical Obstacle (m)				0.9	
Fording (m)				1.3	
Plant Warranty (km)				2,000	
Chassis Service Life (km)				3,000–5,000	
(a) = approximate					
n/a = not available					
n/app = not appropriate					
* from conflicting original sources					

APPENDIX NINE

GLOSSARY AND ABBREVIATIONS

AAMG:	Anti-Aircraft Machine Gun
APFSDS:	Armour Piercing Fin Stabilized Discarding Sabot (sub-calibre rounds)
APU:	Auxiliary Power Unit
BO:	Boyevoi Otdel – fighting compartment
ChKZ:	Chelyabinskiy Kirovskiy Zavod (ChTZ from 15.05.58)
ChTZ:	Chelyabinskiy Traktorniy Zavod imeni V.I. Lenina (ChKZ before 15.05.58)
GBTU/GABTU:	Glavnoye Brone-Tankovoye Upravlenie – Main Tank and Automotive Directorate
GKO:	Gosudarstveniy Komitet Oborony – State Defence Committee
GMT:	Gidravlichesko-mekhanicheskaya transmissiya – automatic transmission
ICBM:	Inter-Continental Ballistic Missile
IMT:	Inzhenerniy Minni Tralshik (IMT) – mine trawl
KB:	Konstruktorskoye Byuro – design bureau
KB ChZ MTM:	KB Chelyabinskiy Zavod Ministerstva Transportnogo Mashinostroenniya SSSR
KB LKZ MTM:	KB Leningradskiy Kirovskiy Zavod Ministerstva

	Transportnogo Mashinostroenniya SSSR – Design Bureau of the Leningrad Kirov Plant of the Ministry of Machine Building of the USSR
KBM:	Konstruktorskoye Byuro Mashinostroeniya (Kolomna) – ATGM rocket development
KO:	Kontrolniy Otdel – control compartment
LKZ:	Leningrad Kirov Plant (Plant No. 185)
LVZ:	Leningrad Voroshilov Factory (later relocated to Omsk as Plant No. 174)
MBR:	Mezhkontinentalnaya Ballisticheskaya Raketa – ICBM:
MBT:	Main Battle Tank
MO:	Ministerstvo Oborony – Soviet (Russian) Ministry of Defence (MoD) Also MO SSSR:
MOP:	Ministerstvo Oboronoi Promishlennosti – Soviet (Russian) MoD Production
MT (i) MS:	Minsiterstvo Transporta i Mashinostroeniya – Ministry of Transport Machine Building. Sometimes MTM
MTO:	Motorno-Transmissionoye Otdelenie – motor transmission compartment
NII:	Scientific Research Institute, e.g. NII-48
NIIBT:	Nauchno-Issledovatelskiy Institut Bronetankovoi Tekhniki – Scientific Research Institute for Armour Technology (Kubinka)
NTK GBTU i MTiTM:	Nauchno-Tekhnicheskiy Komitet – Scientific Technical Committee of the Main Armoured Directorate
NURS:	Neupravlayushchiy Raketnyy Snaryad – unguided rocket projectile
OF:	Oskolochno-Fugasniy – (HE-FRAG) round
OKMO	Opytniy Konstruktorsko-Mekhanicheskiy Otdel – Prototype Design Mechanical Section
OKTB	Osoboye Konstruktorskoye Tekhnologicheskoye Byuro – Special Design Bureau (LKZ)
OPVT:	Oborudovaniye dlya Podvodnogo Vozhdeniya Tanka – underwater tank driving equipment
OTR:	Operativno-Taktichesaya Raketa – operational-tactical rocket
PAZ:	Protivo-Atomnaya Zaschita – anti-nuclear protection
PGRK:	Podvizhnoy Gruntovoy Raketniy Komplek – Land Mobile Rocket Complex
PKP:	Podvizhnoy Komandniy Punkt – mobile control point
PPO:	Protivo-pozharnoye oborudovaniye – fire suppression equipment



PST:	Plavsredstava (Plavayushchaya Sredstva – Tank) – individual swimming means
PTR:	Protivo-Tankovaya Raketa – anti-tank rocket
PTRK:	Protivo-Tankovi Raketniy Kompleks – anti-tank rocket complex
PTUR:	Protivo-Tankovaya Upravlaemaya Raketa – anti-tank guided rocket (ATGM)
PU:	Puskovaya Ustanovka – launch system/gun launcher system
PUOT:	Priboriy Upravelniya Ognem Tanka – device(s) for controlling tank fire
RHA:	Rolled Homogeneous Armour – plate steel armour
RSD:	Raketa Srednogo Dalnosti (Deistva) – MRBM
SM SSSR:	Soyuz Ministrov SSSR – Council of Ministers of the USSR
SPU:	Samokhodnaya Puskovaya Ustanovka – transporter/erector/launcher or TEL vehicle
TPK:	Transportno-Puskovoy Konteiner – transport/launch container
TPU:	Tankovoe Peregovornoye Ustroistvo – tank communications device
TPV:	Tankoviy Pribor Vidomosti – tank viewing device
TsK KPSS:	Central Committee of the Communist Party of the Soviet Union
TsK KPSS i SM SSSR:	Central Committee of the Communist Party and Council of Ministers of the USSR
TTKh:	Taktiko-Tekhnicheskaya Kharakteristika – tactical technical characteristics
TTT:	Taktiko-Tekhnicheskie Trebovaniya – tactical technical requirements
TU:	Transportno-Ustanovochniy Agregat – transporter-installation vehicle
TZM:	Transportno-Zagruzhitel'naya Mashina – transporter-loader vehicle
VNII-100:	Vsesoyuzny Nauchno-Issledovatelsky Institut (later VNII Transmash)
VPK pri SM SSSR:	Voenno Promishlenniy Komitet pri Sovete Ministrov SSSR – Military-Industrial Committee for the Council of Ministers of the USSR

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